~~7.A.f~~

K.

PRINCIPLES AND POWER OF HARMONY.

AND IT CAME TO PASS, WHEN THE EVIL SPIRIT FROM GOD WAS UPON SAVL, THAT DAVID TOOK A HARP, AND PLAYED WITH HIS HAND: SO SAVL WAS REFRESHED, AND WAS WELL, AND THE EVIL SPIRIT DEPARTED FROM HIM. I. SAMVEL XVI. XXIII.

Tartini (Sig.^{r})

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MDCCLXXI.

PREFACE.

THE high opinion which I had long entertained of the muſic of Sig. Tartini, together with his great reputation over all Europe for many years, made me expect ſomething extraordinary from a Treatiſe publiſhed by him, intitled, Trattato di Muſica ſecondo la vera Scienza dell' Armonia. I always imagined he had principles unknown to other Artiſts in his way. A ſuperior effect muſt imply a ſuperior cauſe. In this opinion I was not diſappointed. I found his treatiſe full of many new and well-founded doctrines, practical as well as ſpeculative. To give ſome idea of theſe, is the deſign of the following ſhort Piece.

As there are many parts of the original very complicated, and difficult to comprehend, and as the language it is written in is not generally underſtood, I thought it would not be unacceptable to ſome lovers of Muſic, to ſee his principles explained in a more eaſy way: But my deſign is not to render his treatiſe uſeleſs to muſicians by profeſſion, which could not have been done without almoſt an entire tranſlation, and a great number of plates; on the contrary I mean to excite ſuch perſons to read and ſtudy the original, as the beſt means to make ſome improvement in one of the moſt delightful of all arts.

I doubt not but the greateſt part of my Readers will be offended with ſome of Tartini's ſtrict notions, particularly thoſe contained in the 5th chapter, as being ſo very oppoſite to every thing they have been taught to admire: but before they condemn, I deſire they will calmly weigh and conſider them — that they will reflect that faſhion is never the teſt of truth, though they may ſometimes happen to coincide—and that theſe ſtrict notions do not come from a dull plodding artiſt, who for want of genius would willingly circumſcribe the flights of thoſe, who are bleſſed with ſuperior talents, by the rules of a barren and narrow theory; but from one who, I may almoſt ſay, led the way in the flowery regions of harmony, and of whom moſt artiſts are but diſtant followers. When an artiſt ſpeaks ſlightingly of that in which he excels, one may ſafely, I imagine, rely upon his opinion.

But the Reader will perhaps be apt to think, that inſtead of making an apology for Tartini, I ought rather to make one for myſelf, as having taken the liberty to diſſent ſo frequently from him; and that too without reſerve. But I hope it will be allowed that one may very ſincerely admire an author, and yet freely cenſure him. Thoſe who think otherwiſe, know very little of that mixed character, which is not uncommonly found in men of ſuperior talents. When Huygens, Coſmo. lib. 2. p. 131. ſays of Kepler. 'But he 'ſtood in need of theſe (fantaſtical) ideas, in order to con'firm his coſmographical myſtery, &c.' And again, 'All this myſtery, if well conſidered, appears to have 'been a dream ariſing out of the Pythagorean or Platonic 'philoſophy; nor do his proportions anſwer, &c.' When we read theſe paſſages, can we ſuſpect that Huygens had not a juſt regard for the great and excellent Aſtronomer whom he ſo freely cenſures? The ſame may be ſaid of Mr. Maclaurin, whom I have quoted in the following pages, and who, on the ſame occaſion, uſes the ſame language as Huygens. It appears by many paſſages in my author, that he alſo had ſtrongly imbibed the notions of Pythagoras and Plato; nor is it extraordinary that this ſhould happen to a muſician, when we conſider that their philoſophy was founded on harmonic principles. This was the very characteriſtic of it; and ſo truly great and ſublime it is in many reſpects, that one would be apt to think it originally flowed from a higher ſource than mere human notions; and that it was the obſcure remains of the patriarchal religion, which undoubtedly was very early eſtabliſhed in Ægypt, and from thence was brought into Greece by Pythagoras, but delivered in a myſtical and ſymbolical method as to particulars. This myſtical method, I am apt to think, contributed greatly to miſlead Tartini. Platonic numbers and figures had made a ſtrong impreſſion on his mind, and ſet him upon the very laborious taſk of deducing every thing in muſic from abſtract ideas; but theſe were accompanied with ſuch important phyſical experiments, ſo fine an ear, and ſuch a thorough practical knowledge of his art, that he ſeldom draws wrong conſequences.

I truſt I ſhall not be thought to have miſpent my time in writing on this fine art, if I have, in any degree, contributed towards clearing up the principles of it. To take away all doubt in relation to this point, from thoſe who are unacquainted with the hiſtory of muſic, I will give a liſt of ſome writers upon it. Democritus, Archytas, Plato, Antiſthenes, Ariſtotle, Ariſtoxenus, Theophraſtus, Plutarch, Euclid, Ptolemy, Varro, St. Auſtin, Boethius, Caſſiodorus, Albertus magnus, Pope John XXII. Guido, Merſennus, Galileo, Deſcartes, Huygens, Wallis, Lord Keeper North, Euler, Smith, all of them men of very conſiderable character in their times. In ſuch a liſt of writers who would be aſhamed to be enrolled, even though it were allowed, that on this occaſion they deſcended below their uſual dignity?

Ptolemy very juſtly ſays, 'That it is the buſineſs of 'contemplation and ſcience to ſhew that the works of na'ture are conſtituted according to ſome proportion and 'ſettled order, and not at random, or as it were, by chance. 'But particularly this ought to be done in relation to the 'fineſt of her works; ſuch as theſe ſenſes that approach 'the neareſt to reaſon, viz. the ſight and hearing.' Harmon. p. 7. In this I have laboured and endeavoured to reduce to a greater degree of facility, an art which has hitherto been involved in calculations formidable enough to deter every common reader from attempting to underſtand it, calculations that ſeem to me more ingenious than uſeful, and therefore more fitted to obſtruct than to advance its improvement,

provement, for want of that ſimplicity which ought to accompany every art, and every ſcience.

But ſimplicity cannot be obtained without a juſt and well-founded ſyſtem; and to form ſuch a ſyſtem, is to create, according to the Platonic ſenſe of that word. For it is to take the confuſed elements of things, and bring them into order. Now to do this is to make them the objects of knowledge. For knowledge, properly ſpeaking, is ſeeing the properties, connections, and dependancy of one thing on another; it is ſeeing effects in their cauſes, and therefore it is foreſeeing natural events, and conſequently it is knowing the uſe of things, and in what manner they are to be applied, in order to anſwer our purpoſes.

It is with the utmoſt humility, and a conſciouſneſs of the great diſtance between the great Galileo and myſelf, that I preſume to apply to the doctrines in this treatiſe, what one of the interlocutors in his dialogues is made to ſay of ſome of his diſcoveries. ‘ This extreme eaſineſs wherewith ‘ you manifeſt the moſt abſtruſe concluſions, will be ‘ apt to leſſen the value they had whilſt they lay hid ‘ under contrary appearances: Thus I dare ſay it is with ‘ the generality of mankind; they have a much leſs eſteem ‘ for that knowledge that is ſo very eaſily acquired, than ‘ they have for that, about which more tedious and puz- ‘ zling debates are bandyed to and fro.’

EXPLI-

EXPLICATION

OF

Some TERMS uſed in the following PIECE.

HEXACHORD, in the ſollowing piece, ſignifies the firſt 6 notes ariſing in the harmonic ſeries; vide fig. 1, example 1. This word generally means the firſt 6 notes in the diatonic ſcale; *viz.* C, D, E, F, G, A.

FIRST BASE ſignifies the key-note, ſuppoſe C. — The SECOND BASE ſignifies the 3d of the key-note, or E. — The THIRD BASE ſignifies the 5th of the key-note, or G.

TETRACHORD ſignifies the interval of a 4th, as from C to F.

MONOCHORD ſignifies a muſical ſtring that is ſtopped by preſſing on a moveable prop.

STRING OF THREE SOUNDS ſignifies a ſtring that is ſounded without ſtops, and which always gives the 12th and 17th (i. e. 5th and 3d when reduced to the ſame octave) along with the ſound of the whole.

TRUMPET MARINE ſignifies a ſtring ſounded by touching it gently without preſſing on a prop. In this the longeſt part of the ſtring is ſtruck, and the ſhorteſt part ſounds.

The TWELFTH, in muſic, means the 5th above the octave, which is frequently called the 5th.

The SEVENTEENTH means the 3d above the octave, and is frequently called the 3d.

The DIATONIC Scale, which is alſo called the ſyſtem of the 3d major, or ſharp 3d, is that which has neither Flat nor Sharp belonging to it, as being the primary exemplar of the octave.

The CHROMATIC Scale, which is alſo called the ſyſtem of the 3d minor, or flat 3d, is that which has Flats or Sharps, or both, belonging to it, as being a deviation from the Diatonic, and therefore neceſſarily ſubject to Flats and Sharps, i. e. alterations as to gravity and acuteneſs.——N. B. CHROMATIC, in the vulgar ſenſe of the word, means no fixed ſcale at all, but a variable ſucceſſion of notes paſſing from one key to another, as genius or fancy leads.

When a ſeries of notes is marked by great letters, as G, B, D, the firſt note is always ſuppoſed to be the loweſt, and ſo to aſcend regularly; but when ſmall letters are mixed with the great ones, the ſmall letters repreſent the high notes, and the contrary; thus, ſuppoſe the following letters, *c* E *g* C, here you fall from *c* to E, then riſe to *g*, and laſtly fall to C.

INTRODUCTION.

Numerical proportions.

IN the account I propoſe to give of Tartini's Treatiſe on Muſic, I ſhall have very little to ſay on his Introduction; which conſiſts of numerical proportions and calculations only; though he ſays it contains the foundation of all the reſpective demonſtrations employed by him. But as I ſhall make uſe of other principles, in their nature I hope not leſs certain, and much eaſier to be comprehended, I think it is not neceſſary to enter into any detail on this ſubject. Says he, "I allow and confeſs that "the method employed by me has ſome novelty in it, and con"ſequently ſome difficulty; but I alſo know that they are ne"ceſſary." As to their novelty and difficulty, they muſt indeed be both allowed by every one; as to their neceſſity, that point muſt be left to the deciſion of proper judges. I am ſorry to be forced to own, that he ſets out in a manner that will at firſt ſight offend every mathematician, and hinder many from paying that regard to his book, which it deſerves. He wanted, on this occaſion, a little of that ſkill in writing, which he ſhews in ſo eminent a degree in compoſing, I may ſay in playing; for ſo it is reported of him; viz. the ſkill of paſſing from note to note, and from tone to tone, almoſt inſenſibly. Inſtead of this art, which was ſo neceſſary in writing to mathematicians; for to them he muſt write or nobody; he begins with a ſtrong diſcord, by thruſting into his proportions a geometrical mean, as he calls it, which he owns is no mean at all, as it really is not.

INTRODUCTION.

"Of this geometrical mean," ſays he, "people have no idea, nor "can have, as being contrary to the definition and common "meaning of that term." After this confeſſion, and after having granted to mathematicians all they can wiſh; ſays he, we muſt now ſee what they ought to give up in their turn to muſicians. This idea is quite new! mathematicians will be apt to reply, with indignation: Give up and compound for error! why we retire into the regions of demonſtration in order to avoid it! But however harſh Tartini's language may ſound to delicate ears, there is at the bottom no great harm in calling things by wrong names, provided notice is given; and this is the caſe here. For the reſt, Tartini muſt have employed great thought and labour throughout his whole treatiſe, in order to preſs ſuch calculations as he uſes into the ſervice of muſic, for which they ſeem very ill ſuited. This is all I have to ſay on the Introduction; as entering into a detail would be both tedious and uſeleſs. Thoſe who are curious in ſuch matters may have recourſe to the original, which will be neceſſary to my readers on many occaſions. I now paſs on to Tartini's firſt chapter, which contains an account of all the phænomena on which muſic is founded; and amongſt them one quite new and very important.

CHAP. I.

§ 2.

String of 3 ſounds.

Tartini begins his firſt chapter with giving an account of a well-known phænomenon; which is, that a muſical ſtring, which being ſtruck, one would imagine ſhould produce but one ſound, yet in reality produces three; *viz.* the ſound of the totality, and beſides that its 12th and 17th, commonly called the 5th and 3d, which are in the harmonic proportion $1, \frac{1}{3}, \frac{1}{5}$. The Trumpet Marine, the Common and French, or rather German Horn, have no notes but what are expreſſed by $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$, &c. Vide fig. 1. example 1 or 2. The Trumpet Marine is played upon, not

Fig. 1. example 1 or 2.

not by preſſing down the ſtring on a finger board, as on the violin, violoncello, *&c.*; but by touching it laterally and gently with the finger, which ſerves as a reſt or prop, in ſuch a manner, that the vibrations of the parts of the ſtring, when ſtruck, may paſs on freely to the part not touched, the ſound of which will be chiefly and almoſt ſolely heard. Now unleſs the part of the ſtring which is not ſtruck be an aliquot part of the whole, no diſtinct ſound will be heard at all, but a jarring diſagreeable noiſe. I call $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. aliquot parts of unity, becauſe they are generally called ſo, though Tartini rejects the term; however his way of expreſſion comes to the ſame.

§ 3.

Trumpet Marine, Fig. 2 *further explained.*

For the better underſtanding my meaning in relation to the Trumpet Marine, ſee plate fig. 2, where the line A B repreſents a muſical ſtring; let A C be one half, A D one third; A E one fourth, of the whole, &c.; ſtop at C with the finger, as directed above, and ſtrike C B; and A C, which is not ſtruck, will ſound. Again, ſtop at D, and ſtrike D B, and A D will ſound. Laſtly, ſtop at E, and ſtrike E B, and A E will ſound; and ſo in any other part, where the ſhort part of the ſtring is an aliquot part of the whole. But if a part of the ſtring, as ſuppoſe A F, is not an aliquot part, no diſtinct ſound will be heard, as Tartini undertakes to prove, and is known to be fact. By an aliquot part of any quantity, as of a line, a ſurface, &c. is meant ſuch a part as will meaſure the whole without a remainder. Thus an inch will meaſure a foot, without a remainder, but not a foot and half an inch. I ſhall conſider this ſubject more particularly afterwards. I have dwelt longer on this phænomenon than perhaps may be thought neceſſary, conſidering it is ſo well known; becauſe I ſhall make great uſe of it in the courſe of this piece; and therefore deſire ſuch readers, to whom it is new, to attend particularly to it; aſſuring them, that they will be able to underſtand the principles of muſic by the help of this phænomenon, when a little farther explained; and one or two others, full as eaſy.

§ 4. *Organ.* Tartini obſerves, that the pipes of an organ that ſound, when the full harmony is uſed, are many and various in pitch, and yet but one ſound is heard, which is the loweſt. Their diſpoſitions are different, according to the different ſtops, but all harmonic; it being impoſſible otherwiſe to produce this effect. The notes muſt be C, C, G, C, E, G, or ſome of them. I ſhall have occaſion to mention this, or a ſimilar and very important phænomenon, in another place.

§ 5. *Oſcillation of ſtrings.* Suppoſe there is a number of ſonorous ſtrings of equal thickneſs, and of lengths, as the ſquares of the harmonic ſeries, 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. i. e. as 1, $\frac{1}{4}$, $\frac{1}{9}$, $\frac{1}{16}$, &c. and that thoſe ſtrings be ſuſpended, and an equal weight faſtened to each; the ſounds produced by ſtriking them will be C, C, G, &c. as mentioned in the laſt §, according to the number of ſtrings. The oſcillations alſo of theſe ſtrings will coincide, but with this condition, that while the ſtring 1 oſcillates once, the ſtring $\frac{1}{4}$ will oſcillate twice, the ſtring $\frac{1}{9}$ three times, the ſtring $\frac{1}{16}$ four times, &c. The very ſame thing will happen, if we ſuppoſe a ſeries of ſtrings equal in length and thickneſs, and a weight as 1 be faſtened to the firſt, a weight as 4 to the ſecond, a weight as 9 to the third, a weight as 16 to the fourth. We ſhall have the ſame ſounds as before, and the ſame coincidences, example 1 or 2, fig. 1. **Fig. 1. ex. 2.**

§ 6. *Harmonic unity.* " Theſe," ſays Tartini, " are phænomena commonly known; " their indication and ſignification are phyſically manifeſt. The " ſtring of the monochord, or of the harpſichord, although one in " itſelf, produces three ſounds of the harmonic ſeries. The Trumpet Marine, the Common Trumpet, and the German Horn, nei" ther have nor can have any ſounds but what ariſe from unity as

" harmonic. The pipes of the organ, though different in pitch, " yet form but one ſound, when they are diſpoſed harmonically. " Sonorous ſtrings ſuſpended, when they are in harmonic pro- " greſſion in their ſounds, are reduced to unity in their oſcilla- " tions. Therefore the harmonic ſyſtem reduces diverſity to " identity, multiplicity to unity; and ſimple unity divides itſelf " harmonically, as appears by the three ſounds that are heard " upon ſtriking a ſtring, ſee § 2. Therefore unity, conſidered " in any reſpect whatever, is inſeparable from the harmonic " ſyſtem. The conſequence is perfectly legitimate, becauſe it " ariſes from nature, and therefore is abſolutely independent on " the human will."

§ 7. *Third ſounds.*

The laſt phænomenon which Tartini mentions is quite new, and proves, he ſays, the foregoing doctrines wonderfully; and goes ſtill farther. It is as follows: Two ſounds being given on any muſical inſtrument, which will admit of their being held out for any time, and of being ſtrengthened at pleaſure, as on the trumpet, the German horn, the violin, hautboy, &c. a third ſound will be heard. On the violin, let the notes C E, C$^{\times}$ E, B E, B G, B^{b} G, be ſounded with a ſtrong bow, the third ſounds will be heard as in plate fig. 3. and are marked by cloſed notes or crotchets. The ſame thing will happen if the ſame intervals be ſounded by two players on the violin, diſtant from one another about 29 or 30 feet; always uſing a ſtrong bow, and holding out the notes. The auditor will hear the third ſound much better, if placed in the middle between them, than if nearer to one than the other. Two hautboys will produce the ſame effect, placed at a much greater diſtance, and even when the hearer is not in the middle, and ſtill more if he is. From this phænomenon he deduces all the third ſounds ariſing from ſimple intervals, that together compleat the harmonic ſeries, as far as it

Fig. 3.

is uſed in practice. The 5th gives the third ſound uniſon to the lower note; the 4th gives the 5th below the lower note, &c.; but I ſhall not enumerate all the third ſounds, though the detail is extremely curious and inſtructive, becauſe they would be ill comprehended without plates, and many plates do not come within my deſign; I muſt therefore refer the muſician to the original, which, if he has any genius, will be of great uſe to him in many reſpects beſides this. I will juſt obſerve, that ſuppoſing any interval in any key is ſounded, if a 4th or a 6th of the fundamental note comes into the chord, we have always the 4th of the fundamental for third ſound; in all other caſes we have either the fundamental note itſelf, or the 3d of it. I will likewiſe obſerve, that the ſmaller the interval, the farther diſtant is the third ſound; inſomuch that the third ſound to the interval of the ſemitone minor G*, is the 26th below the loweſt note. Ought not this to regulate the baſs in common practice? *N. B.* There is one exception to the progreſſion above-mentioned, which is when the chord of the 3d major is reverſed.

§ 8.

Muſical ſketch with third ſounds.

He then gives a ſhort ſketch of muſic along with the third ſounds for a baſe, in which he has introduced a new interval into muſic, new in reality, though not ſo in appearance; of this an account will be given in the proper place. In his obſervations on that ſketch there is a paſſage which puzzled me for ſome time, and may poſſibly puzzle others; for which reaſon I will explain it. He reckons, page 17, D♭, G*, amongſt the diminiſhed 3ds, which, ſays he, will appear to be ſuch, by putting G* above. He means to ſay, that putting G* in its place, inſtead of putting it above, the diminiſhed 3d, will appear; and ſo it will if you place every note in its natural order; for then they will ſtand thus, E, G*, B, D♭; where the two laſt notes form the 3d above ſpecified. He obſerves on theſe third ſounds, that if any adjoining two ſimple intervals in the harmonic ſeries 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. be ſounded, the third ſound will always be that of half the ſtring; from whence he draws ſome conſequences which I will paſs over at preſent, and perhaps entirely.

§ 9.
Accounts of diſcoveries in muſic.

We have now gone through the firſt chapter, which contains the moſt curious and important diſcoveries ever made in muſic; diſcoveries fully ſufficient to account for every thing practiſed, or practicable, in that art. Some of my readers may perhaps deſire to know ſomething about the hiſtory of theſe diſcoveries; which deſire I will endeavour to gratify as well as I am able. My account, I foreſee, will be very imperfect; for want of books and previous inquiries; but even an imperfect one may perhaps be better than none, eſpecially as I believe that it is not to be found in any one book.

§ 10.
Noting of muſic.

Unleſs the proportions of intervals in muſic are aſcertained, no muſic can be noted; unleſs it is noted, none regular can be had. Noting in muſic is as important, as an alphabet, or ſomething analogous, in the other arts and ſciences. But how this aſcertaining and noting were to be brought about was the difficulty. That the Greeks looked upon the firſt as a difficulty, and a great one, appears by their attributing its diſcovery to mere chance; and that the ſecond, *viz.* noting, was not more ancient, in their opinion, appears by their attributing it likewiſe to Pythagoras. Vide Meibom. in Ariſtox. p. 105.

§ 11.
Diſcovery of intervals.

The firſt diſcovery then, in order of time as well as importance, was that mentioned § 5; *viz.* that if there be a ſeries of ſtrings, equal in length and thickneſs, &c. and a weight as 1 be faſtened to the firſt; a weight as 4 to the ſecond; a weight as 9 to the third, &c. we ſhall have the ſame ſounds produced, upon ſtriking them, as ariſe upon the monochord when the whole is ſounded, or the parts at the points $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. reſpectively. This diſcovery, or what is ſimilar, is by the Greeks attributed to Pythagoras, and many circumſtances attending it are related. The ſtory is ſo well known, that I ſhould not trouble the reader with it, if I had not particular reaſons for ſo doing. The ſtory then is as follows:

§ 12. *Hammers of Pythagoras.*

Pythagoras one day meditating on the want of ſome rule to guide the ear, analogous to what had been invented to help the other ſenſes, chanced to paſs by a blackſmith's ſhop, and obſerving that the hammers, which were four in number, ſounded very harmoniouſly, he had them weighed, and found them to be in the proportion of 6, 8, 9, 12. Upon this he ſuſpended four ſtrings of equal length and thickneſs, &c. and faſtened weights in the above-mentioned proportion, to each of them reſpectively; and found that they gave the ſame ſounds as the hammers had done; *viz.* the 4th, 5th, and octave to the graveſt tone; which laſt interval did not make part of the muſical ſyſtem before; for the Greeks had gone no farther than the heptachord, or ſeven ſtrings, till that time. This is the abridged ſubſtance of the account given by Nicomachus, in Harmon. Manual. p. 10; Gaudentius, in Harm. Introd. p. 13; Iamblichus, de Vit. Pythag. p. 97; Macrobius, in Somn. Scip. lib. 2. c. 1.

§ 13. *Objections.*

Some difficulties occur to me in this ſtory: 1ſt, If the weights were what all theſe writers mention, the ſounds produced would not have been what they tell us. It is well known, that the weights muſt have been as the ſquares of thoſe numbers. Yet all thoſe who give this account agree as to the numbers; which error ſhews on what a precarious tradition this ſtory was originally founded. 2dly, It ſeems very wonderful, and indeed incredible, that four hammers ſhould be in the proportion requiſite, by mere accident. 3. This ſtory is not told by ſome of the beſt Greek writers, though they ſo frequently mention theſe celebrated numbers, and ſo frequently quote his doctrines in relation to muſic. 4thly, Theſe very numbers were known to the Chaldæans, who, as Plutarch ſays, Vol. II. p. 1028, divided the ſeaſons of the year by the fourth, fifth, and octave; making ſpring as 6; autumn as 8; winter as 9; and ſummer as 12. 5thly, But farther, Pythagoras could not find the numbers 6, 8, 9, 12, by the method above mentioned, without the help of a ſingle ſtring, which would have ſufficed, without any weight at all: For though it is poſſible that he might obſerve that the numbers 36, 64, 81, 144, repreſenting the weights neceſſary to produce the muſical intervals, 4th, 5th, and 8th, ſuppoſed to be heard at the blackſmith's ſhop, were the ſquares of 6, 8, 9, 12; yet he certainly could not from thence conclude, that a ſingle ſtring, ſhortened in theſe proportions reſpectively, would give the ſame ſounds; and therefore he muſt proceed thus.

§ 14. *Diſcovery of intervals.* Fig. 2.

Having prepared a ſtring A B, fixed upon reſts at each end, with a moveable bridge; ſuch an one as Ptolemy uſed, and called a monochord; and having ſuſpended weights, in the proportion of 36, 64, 81, 144, to four ſtrings, he raiſes or lowers the tone of the ſtring A B, till he finds it uniſon with ſtring 36; next he ſtops ſomewhere in the ſtring A B, till he finds an uniſon to the ſtring 64; we will ſuppoſe the point found is E; he meaſures E B, and finds it to be $\frac{3}{4}$ of the whole ſtring. Afterwards he ſtops ſomewhere in the ſtring A B, till he finds an uniſon to ſtring 81; we will ſuppoſe the point found is D; he meaſures D B, and finds it to be $\frac{2}{3}$ of the whole ſtring. Laſtly, he does the ſame in regard to ſtring 144, and finds the point C $\frac{1}{2}$ of the whole ſtring. Now calling

ing A B 12, $\frac{3}{4}$ of 12 is 9, $\frac{2}{3}$ of A B is 8, and $\frac{1}{2}$ A B is 6. Here then we have the numbers that give the 4th, 5th, and 8th; but the ſame might have been done without the weights; for had he tuned ſeveral ſtrings by the means of pegs; as is uſed on many inſtruments; or by the means of weights which he did not know adjuſted, till the intervals became agreeable to the ear, he might, by making uniſons with the ſeveral ſtrings at ſeveral points on the ſingle ſtring, have found the proportions above-mentioned. If we ſuppoſe therefore the very reverſe of this ſtrange tale to have been the caſe, every thing will be natural: For it is highly probable, that ſo curious a man as Pythagoras might try what weights would produce the 4th, 5th, and octave; and he perhaps might be the firſt who ever made ſuch an experiment. This was a ſufficient ground for his ignorant admirers to build the whole ſtory upon, without knowing the true numbers, or the impoſſibility of making out the intervals, without certain circumſtances which they take no notice of. That Pythagoras did actually uſe this method, is probable, becauſe he is ſaid to have recommended the monochord to his diſciples, Vide Ariſtid. p. 116.

Nicomachus mentions
he did it by the chordo
tone

§ 15.
Ptolemy.

The next conſiderable improvement made in muſic was filling up the octave, by Ptolemy the aſtronomer, in a way perfectly conformable to nature. He could not, I believe, prove it to be ſo; that taſk was left for Tartini, which he has done to a demonſtration. Before the time of Ptolemy, there was no fixed rule for filling up the tetrachords: Some pretended to uſe two tones and a ſemitone, which intervals were ſettled by the ear only; for there is no ſuch thing as a half tone, nor can be, in muſic: Others, as Pythagoras, and thoſe who followed his doctrines, made uſe of two tones major, and a limma or remainder, repreſented by the proportion 243 : 256. This limma was arbitrary, as well as the two tones major, there being no two equal intervals following one another immediately in natural muſic. However the tone major, conſidered ſeparately, was perfectly right; for it was found by Pythagoras, upon meaſuring the interval between the 4th and 5th. This gave him an advantage over the oppoſite party, who nevertheleſs continued to conteſt the point, till Ptolemy's ſyſtem was known. From that time this ſyſtem was generally followed, till the temperament took place; and is ſtill practiſed by all fine players on the violin, violoncello, and ſuch inſtruments.

§ 16. Galileo.

From Ptolemy we muſt make a great ſtride, before we meet with any new diſcovery; for the next was made by that excellent philoſopher Galileo; who firſt made uſe of the doctrine of pendulums to explain the principles of muſic, and, I believe, firſt aſcertained the law of the vibrations of pendulums in general. Vid. Diſcorſi e Demonſtrat. Matemat. p. 95, &c. He ſeems to have been extremely fond of muſic, and very deſirous to account for the form of muſical ratios. He ſays he had never met with any thing ſatisfactory upon that ſubject; and indeed nothing had appeared, as far as I know, that gave a phyſical ſolution of the pleaſure we receive from muſic. Abſtract numbers and proportions we meet with in abundance in every writer, both ancient and modern, upon this ſubject; but abſtract numbers and proportions are not phyſical cauſes. Galileo was of this opinion, and therefore ſought for ſomething further; and having obſerved that the times of the vibrations of pendulums are in the ſubduplicate ratio of their lengths; ſo that if you would have the time of the vibration of one pendulum to be double the time of the vibration of another pendulum, the length of the firſt muſt be four times the length of the laſt; and alſo having obſerved, that all the vibrations of the ſame pendulum are performed in the ſame time; he undertook from hence, and ſome other phænomena, to deduce ſuch principles of harmony, as, he ſays, in part ſatisfied him. It is well known that he was miſtaken, when he thought that all vibrations of the ſame pendulum are performed in the ſame time; but this error does not in the leaſt affect his doctrine; becauſe the vibrations of a pendulum in ſmall arcs, and ſmall vibrations in a muſical ſtring, are reſpectively iſochronous. He then obſerves, that, if you ſtrike a ſtring on a harpſichord, it will put into motion, and cauſe to ſound, not only another ſtring, which is uniſon to it, but even the 8th and 5th; for the ſtring that is ſtruck begins and continues to vibrate all the time that its reſonance is heard. Theſe vibrations cauſe the air near the ſtring to vibrate, and, gradually extending farther and farther, affect not only all the ſtrings of the ſame inſtruments, but alſo of other inſtruments that are near. The uniſon ſtring, being diſpoſed to make its vibrations in the ſame time as the ſtring ſtruck, begins on the firſt impulſe to move a little; and a 2d, 3d, 20th, &c. impulſe ſucceeding, and all in periodical times, it receives at laſt the ſame tremor as the ſtring ſtruck; juſt as a pendulum, by repeatedly blowing upon it in a proper manner, may be put in motion.

§ 17.
Phænomenon on a glaſs.

That ſuch vibrations are produced in the air, appears highly probable, from the regular undulations which he obſerved in water contained in a glaſs, upon rubbing it on the edge and making it ſound. This is a phænomenon at preſent commonly known; but what he adds, I do not remember ever to have ſeen; *viz.* that if the tone happens to riſe to an octave, every undulation will be divided into half; an accident, ſays he, that clearly proves the form of the octave to be 1 : 2.

§ 18.
Phænomenon on a harpſichord.

He obſerves farther, that theſe undulations in the air, produced by the ſtring, cauſe not only the uniſon ſtring to vibrate, but alſo any other body diſpoſed to tremble; ſo that if you fix on the ſide of the inſtrument different bits of hair, or other flexible matter, you will ſee, upon ſounding the ſtrings of a harpſichord, ſometimes one of theſe pieces, ſometimes another, tremble, according as the ſtring ſtruck performs its vibrations in the ſame time; whereas the other pieces will not move at the ſound of this ſtring, nor will that piece give any ſound on ſtriking another ſtring.

§ 19. *Phænomenon on copper plates.*

He mentions another curious phænomenon produced upon ſcraping copper, which tends to confirm his doctrine; but I ſhall paſs it over at preſent, and proceed to the concluſion he draws from the phænomena above-mentioned; which is, that the immediate and proximate cauſe of the form of muſical intervals is not the length of ſtrings, nor the tenſion, nor the thickneſs; but the proportion of the numbers of vibrations and undulations of the air, which ſtrikes upon the drum of the ear, and cauſes it to tremble in the ſame time. From hence he accounts for the effect of conſonances and diſſonances, in an eaſy and natural way; but, to avoid prolixity, I ſhall not mention it; and ſhall finiſh all I have to ſay, about the muſical ſyſtem of this excellent and inventive philoſopher, with obſerving, that Dr. Smith does not expreſs himſelf accurately, in ſaying that he (Galileo) called in queſtion the truth of muſical ratios; for he only ſays, that no phyſical explication had been given of them, which is a very different affair; nor has his difficulty any thing in common with that of Huygens, as is there ſuppoſed. Smith's Harmonic. p. 247.

§ 20. *Dr.* Wallis.

I come now to one of the moſt important diſcoveries ever made in muſic; for which we are indebted partly to Dr. Wallis, and partly to two other Gentlemen of Oxford. I ſhall give an account of it in the very words of Dr. Wallis, taken out of the

Philoſophical Tranſactions, abridged by Lowthorp, Vol. I. p. 606.

§ 21. *Points of reſt.* " It hath been long ſince obſerved, that if a viol-ſtring or lute-ſtring be touched with the bow or hand, another ſtring, on the ſame or another inſtrument, not far from it, if an uniſon, or an octave, or the like, will at the ſame time tremble of its own accord. But I can now add, that not the whole of that other ſtring doth thus tremble, but the ſeveral parts ſeverally, according as they are uniſons to the whole or the parts of that ſtring ſo ſtruck. Fig. 4. For inſtance, ſuppoſing A B to be an upper octave to *a c*, and therefore an uniſon to each half of it ſtopped at *b*; if, while *a c* is open, A B be ſtruck, the two halves of this other, i. e. *a b* and *b c* will both tremble, but not the middle point, at *b*; which will eaſily be obſerved, if a little bit of paper be lightly wrapt about the ſtring *a c*, and removed ſucceſſively from one end of the ſtring to the other.

§ 22. *The ſame.* " In like manner, if A B be an upper 12th to *a d*, and conſequently an uniſon to its three parts equally divided in *b*, *c*, if, *a d*, being open, A B be ſtruck, its three parts, *a b*, *b c*, *c d*, will ſeverally tremble, but not the points *b*, *c*. In like manner, if A B be a double octave to *a e*, the four quarters of this will tremble when that is ſtruck, but not the points *b*, *c*, *d*. So if C D be a 5th to *a d*, and conſequently each half of that ſtopped in E an uniſon of this ſtopped in *b e*, while that is ſtruck, each part of this will tremble ſeverally, but not the points *b c*; and while this is ſtruck, each of that will tremble, but not the point E. The like will hold in leſſer concords; but the leſs remarkably as the number of diviſions increaſes.

§ 23. *The ſame.* " This was firſt of all (as I know of) diſcovered by Mr. Wil-

“ liam Noble, M. A. of Merton college; and by him ſhewed to “ ſome of our muſicians about three years ſince; and after him, “ by Mr. Thomas Pigot, A. B. of Wadham college, without “ knowing that Mr. Noble had diſcovered it before. I add this “ further, which I took notice of upon occaſion of making trial “ of the other, that the ſame ſtring as *a c*, being ſtruck in the “ midſt of (at) *b*, each part being uniſon to the other, will give no “ clear ſound at all, but very confuſed; and not only ſo, which “ others have obſerved, that a ſtring does not ſound clear if ſtruck “ in the midſt, but alſo, if *a d* be ſtruck at *b* or *c*, where one part “ is an octave to the other; and in like manner if *a e* be ſtruck at “ *b* or *d*; the one part being a double octave to the other; and ſo “ if *a f* be ſtruck in *c* or *d*; the one part being a 5th to the other; “ and ſo in other like conſonant diviſions; but the leſs remarkable, “ as the number of diviſions increaſeth. This and the former I “ judge to depend upon one and the ſame cauſe; viz. the con- “ temporary vibrations of the ſeveral uniſon parts, which make “ one part tremble at the motion of the other; but when ſtruck “ at the reſpective points of diviſions, the ſound is incongruous, “ by reaſon the point is diſturbed, which ſhould be at reſt.” Philoſophical Tranſactions, abridged by Lowthorp, Vol. I. p. 607.

§ 24.
Rameau.

In order of time, the diſcovery of the three ſounds heard in every muſical ſtring, when ſtruck, which Monſ. Rameau attributes to Merſennus, ſhould have been mentioned before; but I reſerved it for this place; where I am to obſerve, that the abovementioned ſkilful muſician firſt applied this important diſcovery to the purpoſe of practical muſic, and was thereby enabled to reduce its rules into a clearer and ſhorter method, than had ever been done before. But he fell into errors, a few of which I may perhaps take notice of as I go along, for want of knowing ſomething farther, which Tartini has ſupplied.

Aristotle hints a
this and Merſennu
discovered 3. soun
in a string See
Hist. Mus. Vol II
book I Chap. 8

It

CHAP. I.

§ 25.

Trumpet Marine.

It may perhaps ſeem extraordinary, that I have ſaid nothing all this while about the diſcovery of the ſingular properties of the Trumpet Marine, though I took notice of its importance § 3. My reaſon for this omiſſion was, that I am totally ignorant when, or by whom, this inſtrument was invented. I ſhould imagine, that it was not known to the ancient muſicians, as there is not the leaſt notice taken of it amongſt them, as far as I can find; and it does not ſeem probable that they ſhould paſs over in ſilence a phænomenon ſo very ſingular, if they were acquainted with it. On the other hand, the Greeks were certainly acquainted with the Common Trumpet, as early as the time of Homer; yet they never mention the defect of certain notes on that inſtrument, which are juſt the ſame as are wanting on the Trumpet Marine. But whether it was or was not known to the ancients is not a matter of any importance; that it ſhould be known is of the greateſt, as will appear before we proceed much farther. But to return to Tartini.

CHAP. II.

§ 26.

Of the circle and ſquare.

I ſuppoſe there never was an artiſt of real genius, who was not ſolicitous to diſcover the principles upon which his art was founded. Tartini is a ſtriking proof of this aſſertion, throughout his whole treatiſe, and particularly in this 2d chapter, of which I am now to give a very ſhort account, and to me an unpleaſing one. One cannot, without ſome impreſſions of compaſſion, ſee him wandering in the perplexing labyrinths of abſtract ideas, almoſt without a guide, or at beſt with one which it is moſt likely would miſlead him. He muſt have taken infinite pains to purſue nature in a wrong path, and trace her footſteps where ſhe ſeems to have come by chance. He had fancied that harmony was to be found only in the circle, in conjunction with the ſquare, which he looked upon as inſeparable companions, and eſſentially united. They really proved in his hands, what they have been often called, magical; for I can think it little leſs than magic, that he found the miſtreſs he was in purſuit of there, but with ſo few tokens of legitimacy about her, that a man muſt be little leſs than an enthuſiaſt, or he would have ſuſpected ſome deceit, had ſhe not furniſhed proofs in her favour, of a nature totally foreign to what are required in ſuch a caſe, and thoſe confirmed him in his error.

§ 27. **Ptolemy's** *circles.*

Ptolemy was deceived in the ſame manner exactly: He alſo firmly believed, as did all the antients, that no other figure but the circle was worthy of the heavenly bodies to move in: and though it is certain, that the heavenly bodies do not move in circles, yet by the help of geometry, and an ingenious ſyſtem, he was able to ſolve the phænomena of the univerſe almoſt in every caſe. But, in ſome particulars, Kepler affords an example more reſembling Tartini. He was, according to Maclaurin's account, all his life in purſuit of fancied analogies; in which Tartini alſo abounds; and we may apply to the latter, what he (Maclaurin) ſays of the former; that to this diſpoſition we owe ſuch diſcoveries as are more than ſufficient to excuſe his conceits. Account of Sir Iſaac Newton, &c. p. 49.

Kepler.

§ 28. **Tartini's** *errors.*

What I have already ſaid, will be a ſufficient excuſe for my not entering into a detail on this long chapter; as ſuch a detail would be extremely tedious to ſome, unintelligible to others, and would appear ſtrange to the only men, who are qualified to form any judgment on this matter, I mean the mathematicians. However, in order to vindicate the harſhneſs of this cenſure, I will juſt mention one or two inſtances of his errors. 1ſt, he ſays, "that it is demonſtrable by algebra, that unity, and an indeterminate quantity x being given, no other harmonic mean can be found between them but the number 2;" whereas it is de-

monſtrable,

monſtrable, both by algebra and the nature of the hyperbola, that 2 cannot be an harmonic mean between unity and any other number leſs than infinite. This would not ſuit his purpoſe. 2dly, He ſays upon this occaſion, and others, that though there may be demonſtration againſt him, yet his demonſtration may be true, becauſe he means quite another thing by his x, which he calls indefinite, than what mathematicians mean by their x, which they ſuppoſe infinite; and adds, that it is known amongſt mathematicians, that this is not the only caſe, where two oppoſite propoſitions may be demonſtratively proved.

§ 29. *Errors of another kind.* His other errors are quite of another kind, and, beſides being curious as mere matters of ſpeculation, have the merit of leading him right. I call them errors, becauſe they are, as I obſerved before, arbitrarily preſſed into the ſervice of muſic; and not becauſe the propoſitions themſelves are falſe. I ſhall therefore lay Fig. 4. them before the reader. In the circle ABM, fig. 4. let the diameter A M be divided according to the harmonic ſeries, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c.; draw the chords A B, A C, A D, &c. and the ordinates $\frac{1}{2}$ B, $\frac{1}{3}$ C, $\frac{1}{4}$ D, &c. and the complements to the chords M B, M C, M D, &c.; ſquare the chords, and they will be $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. i. e. they will repreſent the harmonic notes in fig. 4, example 1 and 2. Square the chords ſupplement, and they will give $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, &c. viz. the notes in example N° 3, which ariſe from the arithmetical diviſion of a ſtring, ſome of the very notes wanting to fill up the octave in common uſe. Laſtly, ſquare the ordinates $\frac{1}{2}$ B, $\frac{1}{3}$ C, $\frac{1}{4}$ D, &c. and they will be $\frac{1}{2}$, $\frac{2}{9}$, $\frac{3}{16}$, &c. i. e. they will repreſent the notes in N° 4. example, which he calls diſcords; two of which certainly do not belong to the diatonic ſcale; the other three; viz. C, D, F, certainly do; and therefore cannot be called diſcords, according to his own principles.

§ 30.

Lead to truth.

It muſt appear a very ſingular thing, that moſt of all the notes commonly practiſed ſhould ariſe in a regular way from a figure which ſeems to have nothing in common with harmony, and thoſe too in their exact proportions. Who would not be ſtruck with ſuch a coincidence? but who would think of looking for muſical notes in ſuch a place? Yet why not? the circle has bewitched many a ſober man. Its great ſimplicity and beauty, joined to the facility of drawing it, naturally tempts every one to deduce from its properties whatever can be deduced, rather than from the properties of any figure; inſomuch that this is a ſtanding rule amongſt mathematicians. I have no doubt but if Tartini had been as well acquainted with the hyperbola as with the circle, and had the hyperbola been as eaſy to draw, he would have ſought for his ſyſtem rather there; becauſe it is actually in its own nature harmonical; and I verily believe, that, with his ſagacity and unwearied diligence, he would have found the ſame ſyſtem in that figure. But I muſt obſerve, that coincidences are often merely accidental; and therefore are no proof that we have found the true explication of any thing, becauſe we, in our reſearches meet with them: I gave an inſtance of the contrary already, in Ptolemy's aſtronomy. But, after all, how this coincidence ſhould happen will eaſily appear; for fig. 4. $\frac{1}{3} \times \frac{2}{3}$ equals A M or the diameter; i. e. as $\frac{1}{3}$ gives the harmonic note, $\frac{2}{3}$ or the ſupplement will give the correſpondent arithmetic note. But, by the known property of the circle, $AC^2 \times CM^2 = AM^2$; i. e. the ſquare of the chord, added to the ſquare of the ſupplement, equals the ſquare of the diameter; therefore, if the ſquare of the chord repreſents an harmonic, the ſquare of the ſupplement repreſents its correſpondent arithmetical note; for the whole ſquare repreſents the fundamental note: ſo that Tartini has only ſubſtituted ſurfaces in the room of lines. As to ſines, I do not find any ſolution.

§ 31. *Spirit of ſyſtem.* It may be aſked, what occaſion there was for Tartini's ſearching for the notes in N° 2. example, fig. 1, when he had them ready found to his hands, in the very ſtep he took to ſearch after them; for the diameter muſt be firſt divided into $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. i. e. harmonically, before he could apply the ſeveral parts, in order to find the chords. But the diameter is a right line, that might as well be the diameter of any other figure, as well as of the circle; and he wanted to deduce all from the circle. It may be natural therefore for ſome people to aſk this queſtion; but not for any man who ever felt the ſpirit of ſyſtem working in him. Muſt ſome of Tartini's notes be deduced from the circle, and others from a right line? as well give up the whole, or better; for then all conſiſtency, the chief merit, is gone. For this reaſon, he ſet out with endeavouring to prove the inſeparability of the circle and ſquare. Had he not done this, the inconſiſtency I juſt mentioned would, he foreſaw, be objected to him.

§ 32. *Uſe of* Tartini*'s diſcovery about the circle.* Fig. 4. I do not know whether it be worth while to obſerve, that the firſt ſeries, deduced in the manner Tartini has done, furniſhes a method of making a ſquare or circle any aliquot part of another ſquare or circle, where the numerator is unity. For let A M, fig. 4, be the ſide of the given ſquare, or A B M the circle; and let it be required to find another ſquare or circle, which ſhall be to the given ſquare as 1 : 3; draw the chord A C, and the ſquare of it will be the ſide of a ſquare equal to $\frac{1}{3}$ of the given ſquare. The ſame may be done, if a ſquare $\frac{1}{4}$, $\frac{1}{5}$, &c. of a given ſquare is required. But if a ſquare, which ſhall be $\frac{2}{3}$, $\frac{3}{4}$, &c. of another, is required, then draw M C, M D, &c. and do the ſame as before, i. e. take M C, M D, for the ſide of the ſquare required.

The method of making a ſquare, double, triple, &c. of a given ſquare, is well known; but this problem, as far as I know, is quite new.

§ 33. *Drum.*

I have hitherto omitted to give an account of another phænomenon, mentioned by Tartini in this ſecond chapter; it is curious, but whether new, I know not: “Let there be,” ſays he, “a ſonorous cylinder; for example, a drum; let it be beat; and if the two ſkins be uniſon, you will hear two ſounds; one natural to the inſtrument, call it C; the other of conſent, and will be G below, i. e. lower 4th to the natural ſound. Separate from the drum the upper or lower ſkin, leaving the little circle on, which faſtened it down, and kept it tight. When you beat now, you will hear two ſounds, as before; one will be the ſame C, which is the natural ſound; but the other, which is the ſound of conſent, will not any longer be G below, but G above, which is a 5th to the other ſound. The experiments muſt be made with great exactneſs; the two ſkins of the drum muſt be uniſon, equal, and as ſmooth as poſſible, that the effect may be evident.” He draws conſequences from this phænomenon, in favour of his ſyſtem; but ſuch as, I believe, will hardly be admitted by mathematicians. For this reaſon, I ſhall paſs on.

§ 34. Tartini'*s deduction, why right.*

I obſerved above, § 28, that Tartini's deductions from the circle and ſquare give the true ſyſtem of muſic; it may therefore be reaſonable to aſk me, how I can know this, when I look on his theory as imaginary, and all others as imperfect? To which I anſwer, that I know his deductions to be true by another theory, not liable, I believe, to any objection. This theory it ſhall be my buſineſs to explain, in a ſhort compaſs, and in a way level to the capacity of almoſt every reader. I chuſe to explain it in this place, and before I enter upon giving an account of the 3d chapter; becauſe there will begin matter of another ſort, and which ſuppoſes, in general, a knowledge of the principles of muſic.

§ 35. *Trumpet Marine.* Fig. 5.

Inſtead of referring to § 2 for an account of the phænomena of the monochord, I ſhall, for the eaſe of the reader, and alſo becauſe I have ſome neceſſary obſervations to make upon them, repeat the whole again in this place. Let the line K L, fig. 5. repreſent a muſical ſtring, firmly fixed at each end, and ſtretched properly. This ſtring, when ſounded in the way I ſhall deſcribe, is called the Trumpet Marine: K C is $\frac{1}{2}$ of K L, K G $\frac{1}{3}$ of K L, K *c* $\frac{1}{4}$ of K L, K E $\frac{1}{5}$ of K L, K *g* $\frac{1}{6}$ of K L. Preſs the ſtring gently and laterally at any of the points $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. with your finger, and ſtrike the longer part of K L with a bow, and you will hear a muſical ſound, which ſound ariſes from K G, K *c*, K E, &c. and not from G L, *c* L, E L, &c. the longer part. I have placed under every diviſion the name by which every note is called by muſicians.

§ 36. *Trumpet Marine.*

I ſhall now make an obſervation or two on the notes of this Trumpet Marine. 1ſt then, the firſt note that ariſes after the octave $\frac{1}{2}$, is G $\frac{1}{3}$, or the octave and 5th above it, i. e. the 12th above the ſound of the whole ſtring. The ſecond note, *c* $\frac{1}{4}$, is 2 octaves above the whole ſtring; and ſo of the reſt. This progreſſion of ſounds is repreſented in fig. 1, examples 1 and 2. 2dly, No 4th or 6th can ever ariſe in this way; ſo that it ſeems impoſſible to fill up the octave in common uſe, without finding out ſome other method; for we are not to take it for granted, that, becauſe mathematicians have contrived numbers for intervals, that therefore they ought to be adopted as a part of muſic intended by nature; if ſo, many inconſiſtencies and abſurdities would follow, in this and other arts. 3dly, I deſire the reader to recollect what I mentioned towards the beginning of this treatiſe, that no diſtinct ſound will be heard, upon ſtriking the monochord, unleſs the upper part be an aliquot part of the whole, i. e. unleſs it meaſures the whole without a remainder. Now this can never happen, unleſs the fraction that expreſſes the part has unity for its denominator.

§ 37.
Trumpet Marine and Monochord compared.

Theſe things being premiſed, let us proceed. Suppoſe now this Trumpet Marine to be changed into a monochord, and to be ſtopped on a finger board, or bridge, at the ſame point of diviſion, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. and let us ſee what will be the conſequence. In this caſe, if the longer part of the ſtring is ſtruck with a bow, that part will ſound. Thus, if the ſtring is ſtopped at $\frac{1}{3}$, then L $\frac{1}{3}$ will ſound; and ſince K $\frac{1}{3}$ is $\frac{1}{3}$ of the whole, K L, L $\frac{1}{3}$, will be $\frac{2}{3}$; but $\frac{2}{3}$ repreſents a 5th above K L: Therefore the note is the very ſame that we found when the upper part K $\frac{1}{3}$ gave the ſound. Let the ſtring now be ſtopped at $\frac{1}{4}$; then $\frac{1}{4}$ L will ſound; and ſince K $\frac{1}{4}$ is $\frac{1}{4}$ of the whole ſtring, $\frac{1}{4}$ L will be $\frac{3}{4}$ of the whole ſtring; but $\frac{3}{4}$ repreſents a fourth. Therefore we have here a new note called F. Next, Let the ſtring be ſtopped at $\frac{1}{5}$, then $\frac{1}{5}$ L will ſound; and ſince K $\frac{1}{5}$ is $\frac{1}{5}$ of the whole ſtring, $\frac{1}{5}$ E will be $\frac{4}{5}$ of it; but $\frac{4}{5}$ repreſents a 3d major; therefore the note is the ſame that was found when K $\frac{1}{5}$ gave the ſound. Laſtly, Let the ſtring be ſtopped at $\frac{1}{6}$, and then $\frac{1}{6}$ L will give the ſound; and ſince K $\frac{1}{6}$ is $\frac{1}{6}$ of the whole, $\frac{1}{6}$ L will be $\frac{5}{6}$ of it; but $\frac{5}{6}$ repreſents a 3d minor, which is another new note. When I ſay that L $\frac{1}{3}$, and $\frac{1}{5}$ L, give the ſame note as K G and K E, I mean as to denomination; for octaves make no difference.

§ 38.
Monochord and String Trumpet.

Upon theſe phænomena I ſhall make ſome obſervations. 1ſt then, Theſe notes, contrary to the progreſſion of the harmonic notes, deſcend, as may be ſeen fig. 3, examples 2 and 3; from whence this conſequence may be drawn, that the rule amongſt muſicians, that parts in concert ſhould move contrary ways, is founded on nature. That they do deſcend, is evident at firſt ſight; for juſt in proportion as that part of the ſtring is ſhortened which produces the harmonic notes, it is lengthened in that part which produces the correſpondent notes in the common ſcale. 2dly, This ſcale is called the arithmetical; becauſe the new note F divides the octave arithmetically: For ſuppoſing C to be added below, it will be expreſſed by the number 60, fig. 1. example 3. Now *c* 30 falls as much ſhort of F 45, as F 45 does of 60. On the other hand, G 45, the other mean, divides the ſame octave harmonically; for 30 is to 60 as the difference between 30 and 40 is to the difference between 40 and 60. So again, E^{b} 50 divides the 5th, G 40, *c* 60, arithmetically; whereas E 48 divides it harmonically, as will appear upon trial. The uſe of this laſt obſervation will appear afterwards.

§ 39.

Monochord and String Trumpet.

Fig. 2.

My next ſtep will be to ſhew, that the notes in example 3. are naturally connected with the notes that ſtand over them; and that the ſound of the whole ſtring is the univerſal and fundamental baſe of them all, both in examples 2 and 3, fig. 1. In order to prove this, I muſt refer to § 3, where it was aſſerted as a known fact, that when a ſtring ſounds in the ſhort part, it ſounds becauſe it is an aliquot part of the long part, as well as of the whole; therefore, when A $\frac{1}{4}$, (fig. 2.) ſounds, the whole ſtring, as well as the longer part $\frac{3}{4}$ B, is divided into aliquot parts; i. e. this laſt is divided into 3, *viz.* from $\frac{1}{4}$ to $\frac{1}{2}$, from $\frac{1}{2}$ to F, and from F to B, each of which is equal to A $\frac{1}{4}$, and vibrates, and conſequently ſounds, however obſcurely, as well as the longer part, and the whole ſtring. Now the longer part $\frac{1}{4}$ B is a 4th to the whole ſtring, and is the very note found upon ſtopping cloſe at that point of diviſion. I choſe this inſtance to prove my aſſertion, for an obvious reaſon; but any other inſtance would have ſerved as well. Here then we have all the fundamental notes in muſic, *viz.* C, F, G, intimately and eſſentially connected together, and ariſing neceſſarily with the harmonic diviſion. They are the ſame which Tartini deduces, with a moſt complicated apparatus, from various proportions, and groundleſs notions about the circle, and had they not been confirmed by the phænomenon of the 3d ſounds, they muſt have remained of doubtful authority. In order to give the reader a clear conception how all theſe notes ariſe on the trumpet marine, I have exhibited them in fig. 6. N° 1 and 2. They both repreſent the ſame ſtring. N° 1 has the notes ariſing from the ſhorter part of the trumpet marine; N° 2, thoſe ariſing from the longer; and the curves repreſent the vibrations of the part: Thus, while K $\frac{1}{4}$ vibrates in N° 1, $\frac{1}{4}$ L vibrates in N° 2, &c.

Fig. 6.

§ 40.
Objection.

It will be ſaid, perhaps, that, according to the foregoing doctrine, it is not enough that each note ſhould make an aliquot part of the whole, but that each interval ſhould be an aliquot part or parts of every other interval; or, what comes to the ſame, that the intermediate ſpaces between the notes ſhould be an aliquot part or parts of every interval, v. g. the ſpaces fig. 6. N° 1. between $\frac{1}{6}$ and $\frac{1}{5}$, $\frac{1}{6}$ and $\frac{1}{4}$, &c. Let us then examine how this is in fact: If $\frac{1}{6}$ be deducted from $\frac{1}{5}$, there remains $\frac{2}{60}$ of the whole ſtring; if $\frac{1}{6}$ be deducted from $\frac{1}{4}$, there remains $\frac{2}{24}$, or $\frac{1}{12}$, or $\frac{5}{60}$; if $\frac{1}{6}$ be deducted from $\frac{1}{3}$, there remains $\frac{1}{6}$, or $\frac{10}{60}$; if $\frac{1}{6}$ be deducted from $\frac{1}{2}$, there remains $\frac{1}{3}$, or $\frac{20}{60}$. Again, if $\frac{1}{5}$ be deducted from $\frac{1}{4}$, there remains $\frac{1}{20}$, or $\frac{3}{60}$; if $\frac{1}{5}$ be deducted from $\frac{1}{3}$, there remains $\frac{2}{15}$, or $\frac{8}{60}$; if $\frac{1}{5}$ be deducted from $\frac{1}{2}$, there remains $\frac{3}{10}$, or $\frac{18}{60}$. Again, if $\frac{1}{4}$ be deducted from $\frac{1}{3}$, there remains $\frac{1}{12}$, or $\frac{5}{60}$; if $\frac{1}{4}$ be deducted from $\frac{1}{2}$, there remains $\frac{2}{8}$, or $\frac{1}{4}$, or $\frac{15}{60}$. Laſtly, if $\frac{1}{3}$ be deducted from $\frac{1}{2}$, there remains $\frac{1}{6}$, or $\frac{10}{60}$. Hence it appears, that all the intermediate ſpaces between the notes may break into aliquot parts when they vibrate, and that the ſmalleſt vibrating part is $\frac{1}{60}$ of the whole ſtring; and ſuppoſing the whole ſtring be one foot long, the ſmalleſt vibrating part will be no more than $\frac{1}{5}$ of an inch long. That ſo ſmall a part ſhould vibrate ſeems to us almoſt incredible, but nothing ought to be eſteemed really ſo, which is deduced by juſt reaſoning from certain and notorious facts. Thus far all the notes are harmonious; let us ſtep out of the hexachord, and ſee what will be the caſe. Deduct $\frac{1}{7}$ from $\frac{1}{6}$, and there remains $\frac{1}{42}$, which does not divide 60, and therefore has no common meaſure with any of the notes in the hexachord. The ſame may be ſaid of almoſt all the reſt. I have many obſervations to make on the foregoing doctrine; but as my whole ſyſtem is not yet compleatly explained, I ſhall defer them for the preſent; and endeavour to ſet this affair in the cleareſt light I am able, by removing ſome apparent difficulties.

§ 41.

Trumpet Marine and Muſical ſtring.

Firſt, then, the common phænomenon of the Trumpet Marine, § 3, proves, that if an aliquot part of a ſtring is ſounded, the longer part, as well as the whole, ſounds likewiſe; for if it be touched in any point but that which makes the ſhorter part an aliquot of the whole, no diſtinct ſound is heard, but a jarring noiſe is produced. Now this could not happen, if the longer part did not alſo ſound, and by this means produce the jarring above-mentioned. 2dly, That it is poſſible for the longer part, as well as the whole, to ſound in their reſpective totalities, is evident by the phænomenon mentioned § 2. viz. that, when a muſical ſtring is ſounded, the 3d and 5th, or rather the 17th and 12th, are heard along with the ſound of the whole ſtring. 3dly, The experiment mentioned by Dr. Wallis, vide § 20, proves the ſame point. 4thly, The phænomenon of the 3d ſounds, diſcovered by Tartini, confirms the whole. Here then is a coincidence of experiments that mutually ſupport one another; and muſt remove all doubts concerning the propoſition laid down in § 39, that the notes in example 3, fig. 1, are naturally connected with thoſe notes over them in example 2; and the note of the whole ſtring is the univerſal and fundamental baſe of them all. CHAP. II.

§ 42.
Objection.

But it will be ſaid, that there remains behind, example 4. fig. 1. of which I have given no account. This contains the diſcords; and it will perhaps be thought impoſſible to deduce theſe, without uſing his propoſitions, or ſomething analogous to them. If this is impoſſible, then my ſyſtem is incompleat; for theſe diſcords, and many others, are allowed by all profeſſors to be extremely agreeable, and are certainly neceſſary, according to the modern taſte. Beſides, one of thoſe notes is wanted to fill up the diatonic ſcale; viz. D; which by no means can be found in the way I found the other notes. This difficulty muſt be removed, and ſhall be, in the next chapter, to which we are now coming; but I will firſt give an account of a curious phænomenon mentioned in it.

CHAP. III.

§ 43.
Strings with weights as 1, 2, 3.

Towards the beginning of the third chapter, Tartini gives a propoſition which he takes to be new, and I believe is ſo: It is this; that if weights, as 1, 2, 3, 4, &c. be ſuſpended by ſtrings of the ſame diameter, but in length, as A M, A B, A C, A D, &c. i. e. the diameter and chords of the circle anſwering to the points $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. fig. 4. theſe ſtrings, when ſounded, will give the harmonic notes. This I take to be his meaning; for it is not a little obſcure. As I do not underſtand his proof, I will give one of my own. It is a known thing, and mentioned before, that ſtrings equal in length, with weights as 1, 4, 9, 16, &c. will give ſounds as 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. Now 2 is a mean between 1 and 4, 3 is a mean between 1 and 9, 4 is a mean between 1 and 16, &c. But A B is a mean between A M and A $\frac{1}{2}$, A C is a mean between A M and A $\frac{1}{3}$, A D is a mean between A M and A$\frac{1}{4}$, &c. Therefore ſtrings of the lengths A M, A B, A C, A D, &c. with weights as 1, 2, 3, 4, &c. will give the ſame ſounds as ſtrings of the length A M, with weights as 1, 4, 9, 16, &c.; for mean weights with mean lengths muſt have the ſame effects as extreme weights with extreme lengths, reſpectively.

§ 44. *Third minor.* After many numerical calculations, which I ſhall paſs over entirely, Tartini undertakes to account for the ſyſtem of the third minor, that greateſt of all difficulties in harmony, and to ſhew its neceſſary connection with the ſyſtem of the third major, to which he has added a difficulty that was not known before; for he found, that upon ſounding ſome chords in the third minor, p. 67, that the 3d ſounds, which were double, were intolerable; and ſo they appeared to eight profeſſors, who were preſent when the experiment was made; whereas the ſame chords in the third major were perfectly agreeable, producing only ſingle third ſounds. From hence he concludes, that if the third ſounds could be heard as diſtinctly as the natural ſounds, the execution of muſic would be impoſſible, in the ſyſtem of the third minor. But I ſhall not enter upon this ſubject, i. e. the ſyſtem of the third minor, at preſent, as a better opportunity of conſidering it will occur afterwards.

§ 45. *Diſcords.* He proceeds to the examination of diſſonances and diſcordances, and their preparation and reſolution. The notes in example 4, fig. 1, he calls diſſonances; thoſe in example 3, fig. 1, diſcordances. The reaſon he gives for this diſtinction is, that the diſſonances require both preparation and reſolution; the diſcordances only reſolution. He then enters into particulars, and ſhews the manner of preparing and reſolving the 4th, the 6th, the 7th, and 9th; as for the 2d, he rejects it, and proves it to be no diſcord, explaining clearly how the miſtake happened, viz. by an inverſion of the harmony, p. 66. He alſo clears up the diſpute about the 4th, and ſhews that it aroſe by confounding that 4th which belongs to the trumpet marine with that which belongs to the monochord; and laſtly adds a new diſcord, which he calls the ſuperfluous 13th, and reſolves in a new way. Before him, all diſcords, he ſays, were reſolved upon the firſt and ſecond baſe only; this diſcord is reſolved on the third baſe, i. e. G^{*} deſcends to G, which is third baſe to C. For farther particulars, I ſhall refer the reader, who is curious in theſe matters, to the original, which, I am certain, he will find well worthy of his peruſal; and come to what I promiſed, § 42, about the diſcords.

§ 46.

Invention of diſcords.

The method I take to find the diſcords is as follows: Let us take any of the notes in example 3, fig. 1. for a baſe, which muſt be allowable, as they have all been proved to be connected with the harmonic notes that ſtand over them; and let us ſee what will be the conſequence, according to phænomenon § 2. Let the note be G, which ſounded, will give 3d and 5th as harmonic notes. Here then we have not only got D, but B alſo, which was wanting to fill up the diatonic ſcale, &c. and though a diſcord does not appear in any of the ſcales fig. 1. Next let F be made the baſe, which will produce A and C; A was wanting in all the ſcales. Again, take E for a baſe; this will produce G^{*} and B. G^{*} is a new note, and the very ſame with that in example 4, fig. 1; for the interval from G to G^{*} is 24 : 25, as Tartini makes it. Laſtly, take E^{b} for a baſe, and it will produce G and B^{b}; this laſt is a new note, and the ſame with that in example 4, fig. 1.

§ 47.

Tartini *miſled as to diſcords.*

I pretend not to any merit in uſing this method of finding the diſcords; it is the very ſame that Tartini himſelf takes to fill up the diatonic ſcale, as will appear afterwards. Why he did not perſue it, in order to find all the diſcords, I cannot gueſs, unleſs becauſe he was miſled by his fondneſs for the ſquare and circle; which can be the only reaſon why he has omitted B in his ſcale of diſcords, though he calls it a diſcord, and ſhews the different ways of reſolving it; for I ſuppoſe he could not poſſibly find it in his favourite figures. Though I ſpeak thus freely of Tartini, I mean not to ſet myſelf in competition with that truly great artiſt, not even as to theory: On the contrary, had he not traced out the whole ſyſtem as he has done, and pointed out the way in every ſtep I have taken, and ſhall take, throughout this treatiſe, I ſhould never have been able to prove, in a method much more ſimple, and I imagine more convincing, what he undertook to prove with infinite pains; and, I muſt add, with ſome perplexity. Mere accident indeed led me at firſt, having a curioſity to ſee what notes the longer part of a ſtring, if ſtopped as on a violin, at each diviſion of the harmonic intervals, would produce; but without his aſſiſtance I ſhould have been totally incapable of making the uſe I have done, and ſhall do, of this ſcale.

§ 48. *Reſolution of diſcords.* Not only my method of finding the diſcords, but my idea of them, and of their reſolution, is different from that of Tartini: It is taken however from his examples, though not from his doctrine. My idea then of a diſſonance is, that if two conſonant notes be held on, while a third note changes to another harmony, the two notes, which were pleaſing before, become diſagreeable, if not reſolved, becauſe they do not belong to it. All the inſtances Tartini gives of diſſonances and diſcordances, p. 80, 81, are of this ſort. From hence it appears, that all chords commonly called diſſonant, are ſuch by poſition only, and conſequently every note may be rendered diſſonant; but to do it properly is the work of ſkill and genius only. In fact, there can poſſibly be no conſonance but with the harmonic notes, and therefore all chords muſt take their origin from thence, and end there. But beſides the method of introducing diſcords, by continuing two notes while the third changes to another harmony, diſcords may be introduced, by taking in a note before its time, that belongs to another; however this comes to the ſame. Theſe two caſes, and the inverſion of notes, will, I believe, account for all the figures properly placed over baſe notes, for the harpſichord. As to the 7th, I ſhall conſider it in another place.

§ 49. *Errors about diſcords.*

If the foregoing doctrine about diſſonances is juſt, then, 1ſt, what Dr. Smith aſſerts, in his Harmonics, That nature has put no limits between them and conſonances, is not true; but it is a common error to conſider intervals per ſe, and not in relation to a ſyſtem, as Tartini obſerves, and has given an inſtance in two parts, where the 5ths are conſonant, and by adding a baſe to them they became diſſonant. 2dly, It is ſaid in the Harmonics, that there is no harmony without diſcords. This is not ſtrictly true; for there are none, as long as we confine ourſelves to the notes on the ſtring trumpet, i. e. in all tunes properly compoſed for the trumpet and German horn; though there are both the 6ths, the 4th, and both the 3ds, on that inſtrument. But the propoſition is true, as ſoon as we uſe the diatonic ſcale; for there all muſic conſiſts in a perpetual reſolution of imperfect conſonances and real diſſonances.

§ 50. *Apology for ſhortneſs.*

What I have ſaid upon the ſubject of diſſonances, and their reſolution, will appear very ſhort and imperfect, to all ſuch readers as are converſant in the practical part of muſic; but, I think, the ſhortneſs ought not to be deemed as an objection, if there is no deficiency; I mean, as to the principles which I have uſed; as to the practice, I know too well the perplexity and intricacy of this part of muſic, to pretend to give any inſtructions; and were

Chap. III. were I able and inclined to do ſo, it would be unneceſſary, as Tartini has done it already to my hands. I might indeed have tranſlated this part of his work, as I have done ſome others, and as I might have tranſlated the whole; but that did not ſuit my purpoſe. I ſhall therefore put an end to my obſervations on the third chapter.

Chap. IV. Chapter the 4th contains many curious and inſtructive obſervations, of which I ſhall give ſome account in my uſual way, adding, as I go along, reflections of my own. Our author ſets out with a principle, which he had mentioned in the laſt chapter, that harmony muſt be ſuppoſed, before the parts which ariſe from the harmony, i. e. the ſong. The difference between them is this; in the harmony, the ſounds are ſimultaneous; in the ſong, they are ſucceſſive. Theſe ſucceſſive notes conſtitute the octave, and therefore it is of great conſequence to ſettle this. I believe moſt people will be apt to think, that there was not much thought required to ſettle the common octave, which almoſt every one who has an ear can run over with the greateſt eaſe, and, as he thinks, naturally; yet there were many diviſions of it propoſed, before that was invented which now takes place. Ptolemy the aſtronomer was the inventor; and it is no wonder it has generally prevailed from his time to this day, as it is the only one which was truly founded on nature. However this foundation does not appear by any thing we find in Ptolemy; nor does it appear in any other writer, but Tartini, that I know of.

§ 51. *Octave.*

§ 52. *Octave.*

When we firſt begin to learn muſic, we are, or ſhould be, taught to play or ſing the octave: Tartini uſed really to teach it, and ſometimes to the great mortification of his conceited ſcholars; but he does not call it the foundation of muſic, as other maſters do, who do not teach it. However, we are taught to go through it after a manner, and are ever after apt to look upon it as natural; but it is undoubtedly artificial, and the reſult of much and profound thought. However paradoxical therefore it may ſeem, yet it is certainly true, that harmony is more natural than the notes of the octave; for a ſtring cannot be ſounded, either as a trumpet marine, or as a monochord, i. e. in the common way, without producing harmony; whereas the notes of an octave never appear but in highly civiliſed countries. Amongſt the birds we hear the 5th, the 4th, the 3d major and minor; but the notes of the octave from no animal that has not been taught, unleſs we believe the extraordinary account of the Sloth. The intervals we do hear, are thoſe of every muſical ſtring, and therefore muſt be deemed natural.

§ 53. *Octave.*

I have in part anticipated Tartini's method of getting the notes of the octave; but I will nevertheleſs repeat again what I ſaid about it § 46. In order to obtain theſe notes, he takes the four notes which are expreſſed by the numbers 6, 8, 9, 12, or rather three of them, C, F, G; for the octave to C gives no new note; and then conſiders what other notes they will produce, according to the phænomenon of the muſical ſtring. He finds that C gives E and G; F gives A and C; and laſtly, G gives B and D. But theſe notes fill up the diatonic ſcale or octave, and are exactly in the ſame proportions that Ptolemy firſt invented, and that have been in uſe ever ſince. From hence Tartini juſtly concludes, that the ſcale ariſes from the harmony, and not the harmony from the ſcale. This makes a great difference; and we ſhall ſee preſently, that the want of this diſtinction has brought much confuſion into muſic.

§ 54. *Objection.*

But ſome will ſay, why pitch upon theſe three notes to fill up the octave, one of which does not even belong to the harmonic ſeries, viz. F; and particularly when the diſcords § 46 are produced in the ſame way, and yet do not belong to the common ſcale? Is not this arbitrary? An anſwer to theſe objections muſt be made.

Solution. 1ſt then, All muſic conſiſts in cloſes; and theſe cloſes muſt be by riſing a 4th, or, which comes to the ſame thing, by falling a 5th. If it be aſked, Why this muſt be? I anſwer, Becauſe the ear requires it. Farther than this, I pretend not to go. Taking it therefore for granted, as a principle, that in cloſing we muſt riſe a 4th, I ſhall proceed. There is no cloſe in the harmonic notes but from G to C; and the next note that offers itſelf naturally out of that ſeries is F, being intimately connected with G, as has already appeared, and will appear more ſtrongly afterwards. However the ancients hit upon it, I do not pretend to explain; but moſt certainly they adopted it very early, and laid ſuch a ſtreſs upon the invention, that the numbers which expreſſed the two tetrachords became famous above all others. As to the other part of the objection, that Tartini has proceeded in an arbitrary manner; I aſk, whether that which is founded on a coincidence of phyſical cauſes, human ſentiment, and mathematical calculation, can be called arbitrary? Now this is the caſe of the notes of the diatonic ſcale; and thus one of the fineſt arts is built on the moſt ſolid foundation; an art that was undoubtedly firſt begun in Ægypt, and from thence propagated over the reſt of the world, wherever any true muſic has been known!

§ 55. *Temperament.* But why all this trouble, ſome muſicians will ſay, to ſettle the notes of the ſcale, when it is notorious that they muſt all be changed, upon the harpſichord, except the interval of the octave, which alone can be perfectly in tune? Tartini obſerves, and very truly, that ſingers and players conform to that inſtrument. He then ſhews the neceſſity of this alteration of the true muſical intervals, or, as it is called, the temperament; and ſubjoins what

I ſhall

I ſhall tranſlate, for the benefit of the lovers of real harmony.
“ Therefore it is neceſſary to increaſe the 3ds major, that they
“ may fill up the octave; and diminiſh the 3ds minor, that
“ they may not exceed the octave. The worſt is, that this temperament
“ has no certain laws. Some will have it equal throughout;
“ ſome temper more, ſome leſs ſtrongly; laſtly, others
“ more in one place than in another. This is ſo true, that in
“ Italy, and other countries, much ſtudy is employed to find out
“ a reaſonable temperament, in which all nations may agree,
“ (which is not the caſe at preſent,) where this muſic and theſe
“ inſtruments are in uſe. But the caſe is deſperate; becauſe
“ there is no room for a temperament in the form of proportions
“ that ariſe from a ſyſtem; and to pretend to deform ratios
“ with reaſon, is a manifeſt contradiction. This affair ſtands
“ more in need of prudence than of any thing elſe; and I infinitely
“ applaud the opinion of P. Vallotti, our organ-maſter, as
“ the moſt reaſonable of all. He ſays, that you ought to give
“ to the white keys of the organ all their natural perfection; both
“ becauſe they are the natural notes of the diatonic genus, and
“ becauſe in church-muſic the greateſt uſe is made of them;
“ throwing thus the greateſt imperfection upon thoſe black keys,
“ which are moſt remote from the diatonic ſcale, and which are
“ hardly ever uſed. Beſides, he obſerves what pleaſure reſults
“ in playing on the organ (and he was a moſt excellent player,
“ as he is now a moſt excellent compoſer, and thorough maſter
“ of his art) from the contraſt of the greater and leſs perfection
“ of the chords, according as different modulations occur. If
“ the temperament was equal, or a little more, a little leſs, in
“ different places, there would not be that chiaro oſcuro, which
“ in practice produces a fine effect. This is the light in which
“ he conſiders the temperament, and, in my judgment, ſo rightly,
“ that there is no reaſonable anſwer to be made. As for myſelf,

"as my inſtrument is the violin; on which when I play double "ſtops, I can hit upon the very form itſelf of the interval, the "ſign of which is, the 3d ſound, which ought to reſult from "the interval; I have the advantage, for myſelf and my ſcho- "lars, of a ſure intonation, and conſequently of the real uſe of "the above-mentioned ſcale, with all the preciſion of the true "ratios."

§ 56. *Imperfection of* D F. He next proceeds to obſerve, that this ſcale, though regularly deduced, is not entirely perfect in every poſſible relation of the muſical notes that compoſe it. He proves what is well known, and is moſt certain, that D F falls ſhort of a third minor, in the proportion of 80 : 81. "As for myſelf," ſays he, "I leave the "deficiency where nature has placed it, without thinking of di- "viding it; and only obſerve, that this imperfection ariſes from "the third minor, not in general, but ſpecifically from that "which depends on F, which is an arithmetical mean of the "octave." This deficiency of D F makes the famous muſical *Comma.* comma, which has cauſed ſo much diſſenſion amongſt thoſe who have written on muſic; for it is this very deficiency that gave riſe to the temperament; and the temperament has given riſe to many treatiſes filled with ſcience and ingenuity. Salinas, Zarlino, Huygens, Rameau, Euler, Smith, have all written upon this ſubject; all able men; each of whom had his ſyſtem, and each has followers; but which ſyſtem is beſt, is not yet determined. Yet, however they may diſagree with one another in bringing this arduous matter about, they all agree to disfigure the fair form of harmony.

§ 57. *Solution.* But to return, and conſider D F more particularly. Huygens, I believe, was the firſt writer on muſic who obſerved, that if we ſing the notes C, F, D, G, C by perfect intervals, that the laſt C will

C will be lower than the firſt C by a whole comma. His obſervation is undoubtedly true; but his concluſion from thence, that the voice therefore uſes a temperament, cannot be allowed of; for to uſe a temperament, is to deviate from the true proportions required by nature: Now here the proportion 32 : 27, which repreſents the interval D F, is fixed by nature; for F is a 4th to C, and a note of the hexachord, and therefore neceſſarily ſettled; and D is a 5th of the harmony we are going into, and therefore as neceſſarily ſettled. From whence it follows, that the interval D F, pro hic et nunc, is juſt what it ought to be. The truth is, that too much ſtreſs has been laid, by writers on muſic, on the leſſer intervals, and too little on the greater, as will appear afterwards.

§ 58. *Solution continued.*

But I will go a ſtep farther, and obſerve, that D is in this place a diſcord, as every note taken out of the limits of the hexachord, and uſed as a baſe, muſt neceſſarily be. If it be ſhewn, therefore, that D is reſolved as all other diſcords are, nothing more is required, to put an end at once to all the difficulty about this famous paſſage: To ſhew this is very eaſy, by putting the harmony to F, D, and G; vide fig. 7; where F, A are held on, and D added, which becomes in the next chord part of the regular harmony of G. So much for the famous Comma, mentioned in that excellent book, intitled "Coſmotheorus," full of philoſophical imagination; which I ſhall have occaſion to cite, more than once, in the courſe of this work.

§ 59. *Harpſichord.*

I muſt obſerve, that though the deficiency in D F requires no temperament, as appears to me, while we remain in the principal tone G; yet, as ſoon as ever we go into another tone, either a temperament or a new note is required; v. g. you cannot make a full cloſe in G, 5th of C, with the notes only of the common ſcale;

for D A will make an imperfect 5th. From hence it follows, that notes on open ſtrings cannot be properly uſed on the violin in many caſes; as indeed they are avoided, when neceſſary, by all good players on that inſtrument: For four ſtrings, tuned perfect 5ths, following neceſſarily, produce imperfect intervals. I preſume not to add any thing to what Tartini has ſaid about the harpſichord, as I know no remedy for its imperfections; palliating is all that can be thought of, and perhaps the method of doing it now in practice may be as good as any other. Like ſome other fine machines, highly wrought up by art, in order to afford variety of entertainment, it is entitled to indulgence, and muſt not be examined by too critical an inſpection. Inſtead of doing this, I will venture to ſay ſomething about a more homely inſtrument, which was formerly the favourite of our anceſtors, and is ſtill the delight of our reſpectable neighbours the Ancient Britons: Every one will immediately ſee that I mean the Harp.

§ 60. *Harp.* As it is the common method to tune the Harp on any change of the key, this inſtrument is capable of great perfection, and therefore deſerves to be conſidered. Without knowing certainly the uſual method of tuning, I will propoſe one of my own, which perhaps may be new; and was, upon trial, approved of by a very good maſter on that inſtrument. My method is as follows: From C to G, from G to D, perfect 5ths upwards; from C to F, a perfect 5th downwards; from F to A, a perfect 3d major; from A to E, and from E to B, perfect 5ths upwards. Thus we have C, D, E, F, G, A, B. i. e. all the natural notes in the common ſcale; for the flats and ſharps, make from B to F*, and from D to A, perfect 5ths; and we ſhall have a perfect cloſe in the key of G, as 5th of the principal C; and a tune for the Harp ought to wander no farther. However, the reſt of the half-notes, as they are called, may be tuned according to the rule mentioned

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§ 55. N. B. A ought to have a particular mark, when uſed in the key of G. As to tuning the Harp for the 3d minor, that muſt be conſidered after that ſyſtem is ſettled. It muſt be obſerved further, that if the key was to be changed from C to F, it would not be ſufficient, for accurate tuning, to make B flat, and keep all the other notes as they ſtood in C; as will appear by comparing the two ſcales together:

$$C\ \tfrac{8}{9}\ D\ \tfrac{9}{10}\ E\ \tfrac{15}{16}\ F\ \tfrac{8}{9}\ G\ \tfrac{9}{10}\ A\ \tfrac{8}{9}\ B\ \tfrac{15}{16}\ C.$$

$$F\ \tfrac{8}{9}\ G\ \tfrac{9}{10}\ A\ \tfrac{15}{16}\ B^{\flat}\ \tfrac{8}{9}\ C\ \tfrac{8}{9}\ D\ \tfrac{9}{10}\ E\ \tfrac{15}{16}\ F.$$

Here the order of the notes is diſturbed; for from C to D, in the lower ſcale, ought to be $\frac{9}{10}$, whereas it is $\frac{8}{9}$. But it is eaſily remedied: Only make from $B^{\flat}$ to D a perfect 3d major. The ſame may be done in any other ſimilar caſe, i. e. when a new half note is introduced, make the 3d to it perfect, and all the other notes may ſtand. This was done in order to tune for G, as above deſcribed.

§ 61. *Harp.*

By this way of tuning, all the notes will be perfect in two keys, on the Harp. Perfection, in all changes of the keys, cannot be had but with the voice, or on inſtruments that can be ſtopped any where ad libitum; and even on theſe inſtruments perfection cannot be had in ſome caſes, where chords are played. The advantage in this way of tuning is, not only that the intervals are more perfect than in any other way, but alſo, that there will be a reſonance in moſt of the ſtrings, which can never happen when any temperament is uſed. Had we compoſitions made purpoſely for the Harp, of equal taſte with what are to be found for ſome other inſtruments, this inſtrument might poſſibly come once more into vogue, and pleaſe the niceſt ear, that can bear ſimplicity; but ſuch compoſitions are ſcarcely to be found.

§ 62. *Harp.* To confirm what I ſaid above, § 59, that the Harp was formerly a favourite inſtrument in this nation, I will cite ſome paſſages out of our old and beſt writers.

“ Muſic which his [Arion's] *Harp* did make.”
Spenſer, Sonnet 38.

“ Orpheus with his *Harp*.” Ibid. Sonnet 44.

“ By the judgment of Alcibiades, the *Harp* is to be preferred,” &c. Praiſe of Muſic, printed 1586, p. 13.

“ The *Harp* lived after Orpheus was dead.” Ibid. p. 15: And in many other places *Harp* for Lyre.

“ The office of a phyſician is to put the curious *Harp* of “ man's body in tune.” Bacon, de Augm. Scien.

“ His word is more than the miraculous *Harp*.” Shakeſpear's Tempeſt, Act 2, ſcene 1.

“ The battle of the Centaurs, to be ſung by an Athenian eu-“ nuch to the *Harp*.” Midſummer Night's Dream, Act 5, ſcene 1.

“ *Harping* loud in ſolemn choir.” Milton, on the Nativity, Stan. 11.

“ And ſet my *Harp* to notes of ſaddeſt woe.” Id. on the Paſſion, Stan. 2.

“ Touch their immortal *Harps* of golden wire.” Id. at a ſolemn muſic.

“ Then crown'd again, their golden *Harps* they took,
“ *Harps* ever tun'd.” Parad. Loſt, B. 3. v. 365.
“ And touch'd their golden *Harps*.” B. 7. v. 258.
“ And the ſound
“ Symphonious of ten thouſand *Harps*, that tun'd
“ Angelic harmony.” Ib. v. 559.
“ The *Harp* had work,
“ And reſted not.” Ib. v. 594.

“ A golden

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> "A golden *Harp* with ſilver ſtrings ſhe bore."
>
> Cowley's Complaint.

§ 63. *Lyre.* I have quoted no paſſage from Scripture on this occaſion, becauſe David's *Harp* is ſo well known, and the places, which are many, where that inſtrument is mentioned, are ſo familiar to every one; inſtead therefore of uſeleſs quotations from thence, I will juſt obſerve, that the word in the Septuagint, anſwering to *Harp* in our tranſlation, is moſtly Κιθαρα, but ſometimes Ψαλτηριον, Κινυρα, or Ναβλα. All theſe inſtruments are eſſentially of the ſame nature, conſiſting of one row of ſtrings without a finger-board; ſome were ſtruck with the finger, others with a plectrum, and others perhaps with a ſtick, as our dulcimer. Prints of all theſe inſtruments are given by Monſignore Bianchini, in a book intitled, De Tribus Generibus Inſtrument. &c. from ancient monuments. Two of them, tab. 3, fig. 13 and 15, reſemble in ſome degree the common Harp in ſhape: The firſt is taken from an Ægyptian vaſe in the villa Medici; the other from an ancient vaſe, belonging alſo to the Medici family, and has 12 ſtrings, and therefore agrees with the Nablium of Joſephus, as Bianchini obſerves. He alſo obſerves, that the Harp of the barbarians, mentioned by Venantius Fortunatus, in this line,

> Romanuſque lyrâ plaudat tibi, barbarus harpâ;

is properly compared with the Lyre. No doubt, theſe inſtruments are properly compared; for there ſeems to be no difference between them but a little in ſhape, and the number of ſtrings, ſome of which were added after muſic had fallen from its ancient ſimplicity. I will add, that Bianchini finds, what he takes to be a Cithara, or Lyre, on a tripod placed before the bull Apis, in the Iſiac table; which conjecture ſeems not improbable; this figure reſembles the Harp. Diodor. Sic. p. 313, ſays expreſsly, that the inſtrument uſed by the bards was like the Lyre. From all theſe circumſtances, there is great reaſon to think, that David's Nablium did not differ from the Old Britiſh Harp with a ſingle row of ſtrings.

§ 64. *Citbara.* When I ſaid above, that the Κιθαρα, Ψαλτηριον, &c. were eſſentially of the ſame nature, I went on the ſuppoſition, that the Cithara and Lyre did not differ, as Bianchini ſeems to ſuppoſe. It is true, thoſe two words are frequently confounded, even by ancient writers; but Plato, p. 618, plainly makes a diſtinction between them: What the difference was, does not appear, as far as I know. There is a muſical inſtrument in Bianchini, found on an antique vaſe, tab. 4, fig. 7, which is totally different from what is generally called the Lyre, ſuch as is frequently found in the hands of Apollo, the Muſes, &c. It has a finger-board, and therefore moſt undoubtedly was ſtopped in playing, as the lute. This, Bianchini calls a Lyre, or Cithara; but the ſame word cannot properly and critically be applied to two inſtruments ſo totally unlike. I ſhould be inclined to call this the Cithara; and the more ſo, as the words Guitar and Cithern ſeem to be derived from it. What Ariſtotle ſays of the Cithara ſeems to confirm all I have advanced; for he diſapproves of it as an inſtrument to be uſed in education, as being too artificial. This agrees very well to the Cithara, in contradiſtinction from the Lyre, which was vaſtly more ſimple. I will farther obſerve, that there ſeems to be a difference between the Lyras, properly ſo called, in one reſpect; for ſome have a belly, or ſounding-board, others not.

§ 65. *Perfect muſic.* I ſaid, § 56, that to uſe a temperament is to diſfigure the fair form of harmony; and will now add, that they only know what true harmony means, who have heard a well-compoſed piece performed by a ſet of muſicians, who keep perfectly in tune with one another. I never heard ſuch muſic but once, and the effect was wonderful: It was performed in the Pope's chapel, during Paſſion-week: It ſeemed to come from one ſingle voice, and that the chords were only the reſonances naturally belonging to it; or rather, the muſic did not ſeem to be produced by any human voice or inſtrument; but that ſpirits were diverting themſelves, and trying, like Ariel in the Tempeſt, the powers of harmony over the human frame. It may be looked upon as whimſical, but I will venture to ſay, that he who has not heard ſuch muſic as I have deſcribed, may get a better idea of it, by liſtening to Æolus's Harp, than by any other way I can think of. Could we but add air and time to it, it would be the moſt perfect of all muſical inſtruments. But of this more in another place.

§ 66. *Harmonic notes.*

The reſonances which I mentioned above, and by which I mean the harmonic notes, that conſtantly accompany the ſound of every muſical ſtring, are the life of muſic. Without theſe reſonances, every ſound is flat and obſcure; and in a certain degree of this deficiency becomes mere noiſe; a ſtring, that is not perfectly even throughout, gives an idea of what I have been ſaying. When we ſay, by way of encomium, that a voice rings like a bell, we mean to expreſs that effect, which ariſes from the harmonic notes; and probably the want of theſe notes is owing to ſomething analogous to what I mentioned of a ſtring, i. e. the organs that ſerve for ſinging or ſpeaking are not perfectly even or homogeneous throughout. Drawing a good tone out of a violin, I believe, depends not ſo much upon any particular ſleight, as ſome people are apt to imagine, as on the following circumſtances: 1ſt, Having perfectly good and even ſtrings; 2dly, Stopping perfectly well in tune; 3dly, and conſequently, Not uſing open ſtrings on certain occaſions, where they muſt be out of tune; 4thly, Striking at a proper diſtance from the bridge, ſo as not to interrupt the vibrations; vide § 23: All theſe circumſtances are neceſſary, in order to produce the reſonances of which I have been ſpeaking; but are too frequently neglected by muſicians. I do not however exclude a certain ſleight in managing the bow, which ſome can never acquire, and which perhaps cannot be taught by the beſt maſter. Theſe reſonances give to muſic that identity and diverſity mentioned by Tartini; whereby every part is intimately ſympathetic with every other part, and alſo with the whole. From hence it appears, that the word harmony has been with propriety employed to expreſs perfection, in many other ſubjects, where identity and diverſity are in a remarkable degree connected together; but this word has been hitherto thus applied, not ſo much from theory, as from mere mechanical ſenſation. Any temperament whatever deſtroys theſe bands of identity and diverſity, and therefore ought not to be admitted into muſic, unleſs in the way practiſed by P. Valloti, and recommended by Tartini.

§ 67. In order to illuſtrate farther the phænomenon repreſented in fig. 6, N° 1, 2, on which all true muſic ſeems to me to be founded, I will exhibit to the eye what is ſuppoſed to happen when any homogeneous ſtring is ſounded. It is, as I obſerved § 2, a fact agreed on univerſally, that every ſuch ſtring has an accompaniment of 12th and 17th; i. e. $\frac{1}{3}$ and $\frac{1}{5}$ part of the ſtring vibrates, as well as the whole. Let A B, fig. 8, repreſent a muſical ſtring; $AD = DE = EB = \frac{1}{3}AB$; $AK = KM = MO = OQ = QB = \frac{1}{5}AB$; $DM = OE = \frac{1}{3}KM = \frac{1}{15}AB$. The ſtring A B being ſounded, will give the note belonging to its totality, and therefore will vibrate in the manner repreſented by the curve A C B; but it will likewiſe give the 12th, which belongs to each 3d part of the ſtring; therefore each third part will vibrate in the manner repreſented by the curves A F D, D G E, E H B: But it will likewiſe give the 17th, which belongs to each 5th part of the

Trumpet Marine.

Fig. 8.

the ſtring; therefore each 5th of the ſtring will alſo vibrate in the manner repreſented by the curves A I K, K L M, M N O, O P Q, Q R B; therefore the points K, D, M, O, E, Q, are comparatively at reſt, and not only thoſe, but every 15th part of the ſtring; for D M is $\frac{1}{15}$ of the whole ſtring, being $\frac{1}{5}$ of $\frac{1}{3}$; and being an aliquot of the other parts, and of the whole, muſt produce analogous vibrations. Were we to add the vibrations of $\frac{1}{4}$ and $\frac{1}{6}$, and combine them with theſe, the phænomenon would be ſtill more complicated; and yet all theſe ſmall vibrations certainly exiſt, and are ſo far from cauſing any confuſion, that they give the greateſt perfection to muſic.

§ 68.

Difficulty of finding cauſes.

I own the laſt-mentioned phænomenon is incomprehenſible, and ſo is every hypotheſis that has been invented to explain how the air can poſſibly convey diſtinct ſounds to the ear in a full concert. Thus all our ſpeculations lead us at laſt out of our depth: We are obliged frequently to deal with quantities, and other matters of an indefinite nature; in theſe caſes it is our aim, as it is our intereſt, to circumſcribe and bring every object that concerns our perſuits within limits. This aim has produced every ſyſtem, and every hypotheſis, that has diſgraced human ſcience. It is not wonderful, however, that ſo many ingenious men have been tempted into this ocean; where few, very few, eſcape ſhipwreck; when we reflect, that knowledge, without a ſyſtem, conſiſts of nothing but detached ſcraps, with which the memory is overburthened, and the mind very little enlightened. Lucky is he who happens to circumſcribe any portion, however inconſiderable, from the chaos of materials ſet before us by the Deity, for the employment of our faculties, and, by reducing it to order, renders it fit for our purpoſes! How far I have ſucceeded in ſuch an attempt, the world muſt judge; and, if the general voice is againſt me, I will ſay with Huygens, Coſm. p. 10, " If any one ſhall think that I

“ have ſpent my time to little or no purpoſe, in propoſing con-
“ jectures about things, which we muſt allow cannot with cer-
“ tainty be comprehended : I will anſwer, that the whole ſtudy
“ of phyſics, ſo far as it is concerned in finding the cauſes of
“ things, muſt for the ſame reaſon be condemned ; where the
“ higheſt merit is to find out what is probable ; and where the
“ inveſtigation either of very important or very obſcure truths
“ gives delight.”

§ 69.
Counterpoint.

But to return to my main buſineſs. Tartini next comes to the Counterpoint, the eſſential part of muſic. He obſerves, that the 3d, 5th, and 8th, are never marked upon the baſe where they belong, becauſe in a figured baſe they are all ſuppoſed without marking, where there are no figures at all, as being inſeparable from the fundamental baſe, in conſequence of the phænomenon mentioned more than once in this treatiſe. He then diſtinguiſhes the three cadences ; viz. that from G above to C below, which he calls the harmonic, becauſe it goes from the harmonic mean to its extreme ; from F to C, which he calls the arithmetical, becauſe it goes from the arithmetical mean to its extreme ; and the next, from F to G, which he calls the mixt, becauſe it goes from the arithmetical to the harmonic mean. From hence he forms the baſe notes belonging to the octave, in a way that admits of no diſpute. From this baſe ariſes modulation, or tranſition from one harmony to another. Why he has confined the tone of C to this modulation, will be ſhewn afterwards.

§ 70.
Figuring the octave.

He then proceeds to ſhew, that the common way of figuring the notes of the octave is erroneous ; v. g. when a 6th alone is put to D and A, of which Rameau is guilty as to D, calling it a 4th fundamental. This muſt be an abuſe both of words and harmony ; for a fundamental baſe, in its very idea, ſuppoſes no accompaniment but 3d, 5th, and 8th, either direct or reverſed: So much for the words. As to harmony, D never can have the 6th belonging to it, unleſs as 5th of G; in which caſe G is firſt fundamental, and not B, or the 6th; and therefore the 4th alſo ſhould have been added. This is explained, in the cleareſt way, by our author, though it has puzzled the profeſſors, who have hitherto had no certain rule to guide them.

§ 71. *1ſt, 2d, and 3d baſes.*

Tartini very properly calls C, E, G, which notes are heard in every ſounding ſtring, 1ſt, 2d, and 3d baſe, becauſe they are and may be uſed as ſuch, only putting the proper figures over, or, as it is called, reverſing the chord, i. e. putting that above which ought to be below: And this idea gives an opportunity of ſhewing how all the notes in the octave, if uſed as baſes, ought to be figured; which is very different from the common method, p. 106; but I ſhall not enter into the detail, as I could not well explain myſelf without more plates, which ſo ſlight a work does not deſerve. However, I thought it right not to paſs over in ſilence a point of ſuch conſequence; vide p. 106, 107.

§ 72. *Ancient modes.*

He now enters upon a very curious ſubject, on which he throws great light; and has put an end to the many diſputes that have ariſen. The ſubject is, the modes of the excellent compoſers of the 15th century, who uſed a ſcale for prime baſes, which he examines: "This ſcale, as being formed of a mixture of the harmonical and arithmetical progreſſion, has," he ſays, "many "and particular beauties belonging to it; but inſeparable from "a certain crudity of modulation, which many of thoſe compoſers "either could not or would not guard themſelves againſt." He then ſhews, that the crudity or harſhneſs of this ſcale proceeds from the tritones neceſſarily reſulting from it; and propoſes a method to avoid this crudity, by making D and A, in the ſcale of the octave, fundamental baſes, with a third minor; ſo that every note has 3d, 5th, and 8th for its accompaniment. I ſhall not particularly mention how he proves the connection between theſe 3ds minor with the common diatonic; becauſe I think what he ſays is rather too ſubtile; but as this connection gives the two fundamental cloſes in the octave, in a regular manner, there is no reaſon to doubt but that he is in the right.

§ 73. *Mixt ſcale.*

" The effect of the harmony of this ſcale," ſays he, " cannot " fail of being highly agreeable in its modulations; becauſe it " includes in itſelf the two harmonies of 3d major and minor, " different in that reſpect from the ſcale deduced from the harmony " of the three cadences, (he means thoſe of C, F, and G) which " conſiſts, by its very nature, of the harmony of the 3d major " only; and therefore this laſt, as being wholly of the harmonic " genus, will have indeed more force; but the other, which has " a mixture of the harmonic and arithmetical kinds, will have " more variety and ſweetneſs. Whoever knows how to avail " himſelf of one and the other, or of their conjunction, in a " proper manner, according to the nature of the ſubject, will " be able to produce all the effect he aims at."

§ 74. *Diſcords.*

What follows, about reſolving diſcords, I have already conſidered, in another place; and I find nothing in this chapter that inclines me to alter my opinion.

§ 75. *Meaſure.*

His deduction of the meaſure from the cadences is curious and new. Common time, as we call it, or meaſure, ariſes from the octave, which is as 1 : 2; triple time ariſes from the 5th, which is as 2 : 3. " Theſe," adds he, " are the utmoſt limits " where we can hope to find any thing worth notice. This is " ſo true, that many having attempted to introduce other kinds

" of meaſure, inſtead of a good effect, have found the greateſt " confuſion; and ſo it will always happen." I have ſeen muſic with 5 equal notes; but I never ſaw any body who could perform it.

§ 76. *Cadences.*

Our author proceeds to obſerve, that the cadences belonging to the octave do not ariſe from the arbitrary rules of arts, but are required by nature. " I do not, however," ſays he, " draw this " conſequence, that theſe primary examples ought to be an uni- " verſal unalterable law; if ſo, muſic would want the beauty " ariſing from variety: But I will ſay, that variety itſelf ought " to have a pattern to go by, that it may not become extrava- " gant; and that to determine the cadence where it ought to be, " and to reduce the ſenſe of the muſic, or, in other words, its " meaning, to a proper period, contributes greatly towards " unfolding the ſubject propoſed, and making it clear and in- " telligible to the hearers."

§ 77. *Metre.*

When words are ſet to muſic, the length and ſhortneſs of ſyllables ought to be regarded; in ſuch a manner, that a long ſyllable ought to have a longer note belonging to it than a ſhorter; but not only that; for this diſtinction may be exactly obſerved, and yet the effect may be very bad, and abſurd; for it is neceſſary that the accented part, which is the long ſyllable, ſhould alſo be accompanied by the accented part of the muſic. Now, the accented part of the bar is where the harmony of the key is, which, in common time, is, or ought to be, in the beginning or middle of the bar. This Tartini demonſtrates in the cleareſt manner. " It is one thing," adds he, " not to chuſe to have a cadence " upon the harmony propoſed, for two or three bars, dwelling " on the ſame fundamental baſe; and another thing, whether " there is not, in fact, a cadence virtually in the greateſt part

“ of practical caſes; and, in general, whether it is not required “ by nature, in conformity to the primary exemplar in the places “ above mentioned, i. e. the beginning and middle of the bar. “ I am ſenſible, that prejudice may have ſome effect, in making “ a whole orcheſtra accent ſtronger at theſe places, eſpecially in “ certain kinds of muſic, from being uſed to ſee it done by their “ director; but this does not hinder me from holding the ſame “ opinion. The fact is, that, independently of muſical habit, “ I have often obſerved popular and country dances directed by “ a cymbal, an inſtrument void of any muſical ſound. Three “ things I have obſerved upon this occaſion; greater and leſs “ ſtrokes equivalent to long and ſhort; the moſt exact confor-“ mity with the two kind of meaſures, common and triple; and “ always ſtronger ſtrokes in the beginning of each reſpective “ meaſure or bar. Being thus convinced by a fact reſulting from “ nature, and perſuaded, that, in ſimilar circumſtances, the “ ſame thing muſt happen in every other nation, I am con-“ ſtrained to rely on my theory, ſupported and proved in ſuch “ a manner as to take away all ſuſpicion of prejudice.” The ſame thing does actually happen in Perſia, by Kœmfer’s account. I ſhall tranſcribe what he ſays about this point, when he is deſcribing the way of life amongſt the inhabitants of Ormuz, during the hot months, which they paſs in the palm-groves, upon the neighbouring mountains: “ The Perſian muſicians,” ſays he, Amæn. Exotic. p. 743, “ know no rules; they have no ſkill in “ ſinging or playing; but they keep well in time, uſing only “ uniſons, or octaves; and vary their rhythm, or time, in ſo maſ-“ terly a manner, that their muſic not only pleaſes the ignorant, “ but even the learned; who cannot but wonder, that the com-“ mon people ſhould excel ſo perfectly in a thing, which we are “ taught with much pains.

§ 78. *Rhythm.*

Sir Iſaac Newton ſays, Chronol. p. 14, that the Idæi Dactyli "keeping time by ſtriking upon one another's armour with their "ſwords, brought in," i. e. into Greece, "muſic and poetry." This account ſeems to me to be highly probable; for rhythmical, or meaſured motion, always has, in ſome degree, and always ought to govern, poetry, as well as muſic. Suppoſe thoſe country people mentioned by Tartini, who danced to the Cembalo, had prevailed on a poet and a muſician to give them words and air to their meaſures; is it not evident, that one in his cloſes, and the other in his metre, would have been tied down to the rhythmic motion? Tartini therefore juſtly lays a great ſtreſs upon the rhythm, as the ancients did; for unleſs this is well marked, muſic is lifeleſs, inſipid, and, one may ſay, without a ſoul, as it is bereaved of that which firſt produced it. On the contrary, the effect of a well-compoſed minuet, a jig, or a horn-pipe, on the generality of mankind, is a ſufficient proof of the efficacy of rhythm, I may ſay, of its magic. It is this which gives air to a tune, and which ſo few muſicians have excelled in. Learned and ingenious compoſitions we have in abundance, ſuch as make a very handſome appearance upon paper; but they are forgotten as ſoon as the performance is over. I will obſerve, upon this occaſion, that if the blackſmiths hammers ever were of uſe to muſic, it muſt have been by ſhewing the power and beauty of rhythm; for it behoves all thoſe who work in company at the anvil, to be very careful in keeping time, as great miſchief would happen from the want of it.

§ 79. *Accents muſical and metrical.*

Nothing is more certain than what was ſaid, in the beginning of § 77, ought to be an inviolable rule in vocal muſic; viz. that accented ſyllables ought to be accompanied with accented notes. I will not particularly examine, how far this rule of nature is obſerved; becauſe, as things go on at preſent, any notes will ſerve for any words: Theſe are ſo frittered away, that they ſeem rather the ghoſts of mangled words, lingering and ſticking to the tongue, like the ghoſts of wicked men, which, as Plato ſays, are frequently ſeen hovering about their tombs. But I will leave them to linger and hover on, according to the mercy of their arbitrary maſters; and return to the dictates of nature, which determine, that muſical and poetical accents ought to go together. This is ſo certain, that no muſician in his ſenſes would, in common time, begin his ſubject, if the verſe is iambic, without putting the ſecond ſyllable at the beginning or middle of the bar, as long as he has any regard to the words at all; whereas, if the verſe is trochaic, he will as certainly put the firſt ſyllable in the aforementioned places.

§ 80. Iſ. Voſſius *on Rhythm.*

Iſaac Voſſius publiſhed a treatiſe concerning vocal muſic and rhythm, in which there are many ingenious and ſolid obſervations, ſhewing how much the antient Greeks ſurpaſſed the moderns, by their attention to the rhythm and metre of their muſic and poetry; that muſic cannot be perfect without this attention; and that the Greek and Roman are more adapted to muſic than any of the modern languages. All theſe propoſitions muſt be allowed to be true; but when he ſays, that, for want of long and ſhort ſyllables, no good muſic can be compoſed at preſent, I think he goes too far. That our proſody is not exact; i. e. that we have not the ſame regard to the quantity of ſyllables, ariſing either from what grammarians call nature, or from poſition, is certain. The Greeks, we know, had fixed rules, by which the quantity of almoſt every ſyllable in their language was determined; and no poet could offend againſt thoſe rules without incurring contempt. The Romans imitated them in this, as in every other art, as far as their genius would allow. But it does by no means follow, that, becauſe we fall infinitely ſhort of the preciſion of the antients in this particular, the modern languages will not admit of good vocal muſic. Could Voſſius read any modern poetry, and not obſerve that it was regulated by accent; now accent implies quantity. It is true, that our ſhort ſyllables are often loaded with conſonants, which makes them very uncouth and difficult to pronounce; and this great defect throws an additional burthen on the ſinger, which would be avoided in a ſmoother language; but ſcarcely, if at all, affects the compoſer, if the poetical numbers are juſt, and the words expreſſive. Monſieur Rouſſeau has taken up this opinion of Voſſius, and applied it to the French language; but, as I do not remember that he has enforced it by any new reaſons, I ſhall not particularly meddle with this lively writer, and only obſerve, that the French language is perhaps leſs capable of being well ſet to muſic, than other polite languages in Europe, for many reaſons which might be given.

§ 81.
Proſody Italian.

But, whatever the caſe may be with the French language, in relation to muſic, it muſt be allowed, that the Italian is not wanting in variety of long and ſhort ſyllables. They have many words of two ſyllables, that are iambic, as coſì, trovò, virtù, però, &c.; very many that are trochaic, as canto, parla, ſono, uſo, &c. which may alſo ſerve as ſpondees; many words of three ſyllables that are dactylic, as trovano, parlano, proſſimo, ottimo, &c.; ſome anapæſts, as vanità, unità; many that are amphibrachys, or Bacchian, as catena, fidele, alcuno, &c. There is alſo great variety in the words of four ſyllables, as curiōſo, infinīto; intrinſĕco, malevŏlo, veriſsĭmo; difficoltà, perpleſſità, ebrietà, &c. This variety of accents, joined to the wonderful ſmoothneſs of the Italian tongue, gives it a ſuperiority, for the purpoſe of ſinging, over all the modern languages, that cannot be diſputed.

Engliſh.

Were it not for this want of ſmoothneſs, we might perhaps be rivals to the Italians; for ſome of our words of two ſyllables are iambic, as deteſt, employ, belong, &c.; others trochaic, as level, hinder, bleſſed, kindred, &c.; many of our words of three ſyllables have the accent on the firſt, as uſury, lenity, villany, &c.; ſome on the ſecond, as conſider, beloved, deliver, &c. The attempt of Sir Philip Sidney, to introduce what is called heroic verſe into our language, ſucceeded ſo ill in his hands, and has been ſo much ridiculed ever ſince, that I was carried away with the ſtream, and once thought we could not uſe dactylic feet; but I am convinced of the contrary, and ſhall now make it evident, to any competent judge, that we not only may, but do uſe them. Every ſcholar will own, that the following verſe,

Πολλα δ᾽ αναντα καταντα παραντατε δοχμιατ᾽ ηλθον,

conſiſts of dactylic feet, as being a verſe in Homer. Now, add the word γαρ at the beginning of it, and cut it off at παραν, and I deſire to know what difference there is between that, and this well-known Engliſh verſe,

My | tīme, ŏ yĕ | Mūſĕs, wăs | hāppĭlў | ſpēnt :

That the metre is fundamentally and eſſentially the ſame, is evident from hence, that if any compoſer was to ſet theſe lines to muſic, he muſt neceſſarily accent both on the ſecond ſyllable; and, which is more to the purpoſe, the ſecond ſyllable, and the two following ones, muſt make a whole bar, or half a one, which is the ſame thing; and the two laſt notes of the bar together ſhould in ſtrictneſs be equal only to the firſt by itſelf. N. B. The redundant ſyllable, *ſpent*, at the end of this verſe, joined to the firſt ſyllable of the next, and ſo on, keeps up the rhythm throughout the whole ſong.

§ 82.
Diſcordant notes.

I wiſh it were conſiſtent with my deſign, to give a full account of Tartini's doctrine on this head, which is very clear, and very inſtructive to muſicians; but, beſides that many plates would be required, I always meant to refer the inquiſitive reader to the original. After having given an example of the right manner of uſing diſcordant notes, with reference to cadences, he ſays, "Infinite deductions ariſe from this example, as a firſt principle, "which may be equivalent to an entire practical treatiſe. But "my intention is to eſtabliſh firſt principles, exemplified ſo far "as is neceſſary, and no more." He then adds the following muſical canon: "*You may confine the diſcordant notes within limits, as much leſs as you pleaſe than half the bar*; *but never ought* "*to let them exceed it.* There may," ſays he, "be ſome exceptions, in regard to ſuch modes of muſical expreſſion as are familiar to the reigning taſte, in which no ſcruple is made to "ſubſtitute the ſhadow for the ſubſtance; i. e. inſtead of the "fundamental notes of the ſong, to give us thoſe which are deduced from them. According to this taſte, the diſcordant "notes may very well be placed in the beginning and middle of "the bar; but this, being a more than ordinary poetical licence "of the preſent age, does not affect the truth of the above-mentioned canon."

§ 83.
Antient chromatic.

Tartini enters next upon a moſt perplexed and intricate ſubject, viz. the chromatic and enharmonic ſyſtems of the Greeks; which though he does not pretend to have cleared up, yet he has evidently ſhewn, that either theſe genera have been totally miſunderſtood by the moderns; or that the antients uſed them in direct oppoſition to the firſt principles of harmony. He has given an example of his own, in the chromatic, which is practicable, and which proceeds by two hemitones following one another, and an uncompounded interval conſiſting of three hemitones. Now this is perfectly conformable to what all the Greek writers on muſic call the chromatic; but this in reality ſeems to be nothing more than a common paſſage from a 3d major to a 3d minor. It may

be

Chap. IV.

be aſked then, How this chromatic happens to be practicable, and the antient not? The anſwer is, That the antients began theirs, as is generally thought, from a note that was diſtant from the next above it by a hemitone; v. g. from B to C, and from thence to C*, and E, which completed the tetrachord, but which led into a tone which had no relation to the firſt: Whereas Tartini ſets out from G, then goes to G*, A, and C. This method carries him from C 3d major to A 3d minor; which two keys are moſt intimately connected. I ſhall have an opportunity of giving an idea of another chromatic, by the aſſiſtance of Tartini, but not according to the antient ſyſtem; which is, I believe, as well as many other things relating to the Greek muſic, a perfect enigma; though we have ſo many conſiderable old writers on that ſubject, and ſo many commentators upon them; ſome proofs of this I ſhall offer in the courſe of the preſent work. A plain proof that the antient and modern chromatic are intirely different, is, that, according to Ariſtoxenus, two tones cannot follow one another in that genus; p. 65.

§ 84.

Antient enharmonic.

Tartini, after having examined the ſuppoſed chromatic of the antients, proceeds to the enharmonic, which he likewiſe finds to be contrary to the principles of harmony: But he undertakes to give one of his own, by means of a note, as he ſays, out of the limits of the hexachord, expreſſed by $\frac{1}{7}$, which he calls a conſonance; giving us to underſtand that is a note ariſing from nature, and is ſounded with the greateſt facility on the trumpet marine and German horn. But when he comes to give an example of the uſe of this note along with the baſe, it appears not to be the note he imagined. B^{ω}, it is true, which is expreſſed by $\frac{1}{7}$, when C is principal note, ſtands againſt C in the baſe, and very properly; but C here is 5th of the tone; for the tone is F; and therefore B^{ω}, as he marks it, is not 7th, as it ought to be, but 4th, of F. The whole is cleared up, when he tranſpoſes his example out of F into C; for then G with the 7th minor is nothing but the common chord, in paſſing from the 5th of the tone to the cloſe, and therefore requires no particular reſolution, as appears both by common practice and by theory; for F 7th of G is a conſonant note, that joins the harmonic and arithmetic ſyſtem together. It is true, he lowers F natural; but owns afterwards, that it is ſo near the truth, that it does not in the leaſt deſtroy the fine effect of the harmony.

§ 85.
Enharmonic of Monſieur Rameau.

From what has been ſaid, it appears that our author has not diſcovered the enharmonic, any more than others, who have attempted it before; but he has however kept within the bounds of harmony, with that ſobriety and excellent taſte, which never ſuffer him to go wrong in practice, however he may ſometimes be miſled by his theory. But Monſieur Rameau, Generat. Harmon. p. 153, not altogether ſo well qualified in thoſe reſpects, undertook to give us an enharmonic ſyſtem, not only in theory but in practiſe; for he ſays he had introduced it into one of his operas. He owns honeſtly indeed, that it had not all the effect he expected from it; but this he attributes, as is uſual in ſuch caſes, to the bad execution of the performers. He had more reaſon, in my opinion, to take all the blame to himſelf; for his enharmonic conſiſts in one of the groſſeſt paralogiſms that ever entered into the head of a muſician. It is a thing well known, that on the harpſichord the ſame key is made uſe of for two different notes, belonging to harmonies, that have no relation to one another. What then is the art of Monſieur Rameau? Why truly, nothing more nor leſs than, by help of this ambiguous way of marking two notes, to join two harmonies together that ought never to meet. This method he dignifies with the name of enharmonic; and ſays, that it makes you ſeem to paſs in an inſtant from one hemiſphere to another; an excellent conceit this, no doubt, to recommend muſic,

The author seems
not to be aware that
Salinas has deter
mined the true
enharmonic

which, from the earlieſt times down to our own, has furniſhed all the civiliſed part of the world with ideas of beauty ariſing from identity and diverſity combined together. But if he had a fancy to hurry his audience to the antipodes in ſo precipitate a manner, why not begin with A natural, 3d major; and, after having well ſettled the tone, ſtep at once boldly into E♭, 3d major; which would have anſwered his purpoſe full as well. But to return to Tartini.

§ 86. *Tritone.* He obſerves, that in going through the octave with the full accompaniment, the inconcinnous interval of a Tritone between F and B ariſes; which he ſays has a very good effect in aſcending, as the progreſs is from worſe to better, i. e. from the arithmetic to the harmonic ſyſtem; but that in deſcending it is by no means to be allowed, and is an error when practiſed. I ſhould rather think, that the reaſon of this difference is, that in aſcending F, which makes a tritone with B in the next chord, becomes afterwards the 7th of G, and ſo is reſolved, as belonging properly to it, before the cloſe in C: whereas in deſcending to the next chord, which is C E G, F cannot be held on, and conſequently there can be no reſolution. It appears to me evident, that there is no poſſibility of going through the octave in counterpoint without a diſcord, and therefore the octave, conſidered as proceeding by tones and hemitones, is merely artificial. Tartini's laſt obſervation is a proof of this; for if every note were natural throughout the ſcale, i. e. if the ſucceſſion were natural, it would be quite indifferent whether we aſcend or deſcend, as in the diatonic hexachord and heptachord.

§ 87. *Perfection of the diatonic.* I am now coming to the concluſion of the 4th chapter, and ſhall give ſome of his obſervations on the doctrines contained in it, in his own words, as follows. "In relation to the univerſal diſſonant ſyſtem, the fundamental harmony by which the diſſonances are regulated is always diatonic; as there is not, nor can be, any caſe, in which a diſſonance is founded on any other notes but the 3d, 5th, and 8th. Here then is explained by practiſe what I undertook to prove demonſtratively in the ſecond chapter, in relation to the hexachord, as to the period and completion of the phyſico-harmonic ſyſtem, in its utmoſt extent.” I omit ſome lines, which would be unintelligible to thoſe who have not read the original; after which, he goes on thus: “We find, that the diatonic ſyſtem is regulated by itſelf, and is compleat by itſelf; and therefore it was uſed by the Greeks, by the old Italian compoſers, and is uſed by us at preſent, whenever we pleaſe, according to the rigor of its nature and conſtitution. We find laſtly, that whatever addition is made to it, may be a regular conſequence, but can never be neceſſary; for whatever is more than the diatonic, although it is a different mode of harmony, is not a different ſubſtance. As a ſubſtance, it is deduced from the hexachord; and it is impoſſible to alter it either in theory or practiſe.” In this I perfectly agree with my maſter; and it is not without much regret that I have been forced ſo frequently to diſſent from him, in this as well as the foregoing chapters. I can only ſay, by way of apology, that I was very far from ſetting out with an intent to criticiſe. I had, and ſtill have, the higheſt opinion of his performance; but the light which he himſelf afforded enabled me to diſcover another path, that ſeemed to me more ſure and leſs intricate. Had I not been led into it by his aſſiſtance, in all probability I had never made the uſe I have done of the trumpet marine; though I had long ſurmiſed, that it might, in ſome way or other, be turned to better purpoſes than what it had been applied to. It has already, I hope, been not unſucceſsfully employed; but its uſe will ſtill be more evident before I have done, Chap. IV. ſhould I not happen to be miſled by that overweening fondneſs which all men have for their own productions, and which therefore ſtands in need of no apology. Fere unumquemq; ſua ſibi velle cogitata parere, et parta fovere, nec novum eſt, nec uſque adeo intolerandum. Valſalva.

§ 88.

A ſummary view of the next chapter.

I have now gone through four chapters out of ſix, which make the whole of my author's treatiſe. If I have done tolerable juſtice to this excellent work, I have no doubt but that all my muſical readers, I mean of the profeſſion, will have a great curioſity to conſult the original; others perhaps, not unſkilled in muſic, may be contented barely to ſee what principles their art is founded upon. This is a curioſity which I can hardly ſuppoſe any lover of muſic to be without: But, however that may be, I am now coming to a part of the work, which muſt intereſt every one who pretends to taſte in this way; becauſe it contains the judgment of the greateſt of all modern maſters, on a ſubject that very much divides the muſical world. As this part of my work will be much more entertaining to ſome of my readers, ſo it will be much eaſier for me to execute. Inſtead of picking out what I looked upon as eſſential, in order to give ſome idea of the new principles with which the original abounds; inſtead of taking pains to reduce theſe principles into the narroweſt compaſs poſſible, and putting them in the cleareſt light I was able; laſtly, inſtead of taking no ſmall pains to underſtand my author's doctrines, which are ſometimes very obſcure, I ſhall not have much to do, in the following chapter, but to tranſlate.

Chap. V.

§ 89.

Introduction.

Tartini begins his 5th chapter in the following manner: "As, "from the difference of muſical keys, and from the different po-"ſition of the common diatonic ſcale, the modes or muſical tones, "which are an eſſential part of our church-muſic, and ſtill more

“ ſo of the antient Greek muſic, are deduced, this chapter be-“ comes neceſſary; in which, however, there is hardly any thing “ demonſtrative, and very little phyſical. Hitherto I have ſailed “ through an ocean of my own, and have always been ſure of “ my courſe; but to obey you, illuſtrious Sir,” addreſſing himſelf to his friend, “ I muſt now enter into another ocean, unex-“ plored hitherto by any one, and do not know what will be my “ fate. Do not therefore expect from me, in this chapter, that “ boldneſs, which ariſes from a conſciouſneſs of truth; ſuch as “ you have ſeen in the preceding chapters. Look favorably, “ however, on this real ſacrifice of my obedience, as I enter on “ ſo nice a ſubject without any ſure guide; knowing how deſirous “ you are to go to the bottom of a matter ſo truly intereſting.”

§ 90.
Muſical modes of the Greeks.

“ The ſubſtance of what I am going to undertake, is, on one “ ſide, the diſcovery of the muſical modes; by the means of “ which, and of poetry, the antient Greeks excited and appeaſed, “ at their pleaſure, the paſſions of the human mind: And, on the “ other ſide, the compariſon of the antient modes with our mo-“ dern modes. In order to reduce to the greateſt clearneſs poſ-“ ſible, an affair the moſt involved and obſcure that can employ “ one's thoughts, it is neceſſary, in the firſt place, to underſtand “ what is meant by the word mode. A mode then, in general, “ according to the antient meaning, (called by the Greeks by the “ name of trope, harmony, &c.) ſignifies a ſong determined by “ rule, as to gravity and acuteneſs; as to intervals; as to aſcent “ and deſcent; as to muſical accents, relative to the metre; and “ as to the inſtrument which accompanied the ſong of the muſical “ poet. Thus again, as the matter, treated by the poet, was “ melancholy, or chearful; decent, or laſcivious; furious and “ bacchanalian, or grave and religious; &c. ſo there were de-“ termined and ſpecific modes with the particular conditions of “ certain

Vide Sir F. Egles

" certain limits as to gravity and acuteneſs; of certain accents " relative to a certain metre, and a certain inſtrument. Every " mode had its particular name, as Dorian, Phrygian, Lydian, " Æolian, &c. and was adapted preciſely to that particular mat- " ter for which it was inſtituted."

The modes coincide with the species of diapason which Tartini seems not to have known nor his commentator

§ 91.

Accounts of them vary.

" The above-mentioned account of the antient modes is all we " can gather with certainty and clearneſs from hiſtory; and in this " all hiſtorians antient and modern agree, ſome more, ſome leſs. " If, in vertu of this account, it is expected that we ſhall be able " to point out the individual above-mentioned circumſtances, the " caſe is deſperate; becauſe the antient hiſtories, and much more " the modern, contradict one another; and what is ſtill worſe, " monuments and examples are entirely wanting. It ſeems there- " fore a natural conſequence, that one may reaſonably doubt " whether the account is true or not; but, in ſpite of doubts " about the truth of the accounts found in antient hiſtorians, " concerning the Greek muſic, ſuch are the antients who give " thoſe accounts, that it would be the height of raſhneſs not to " believe them. Plato and Ariſtotle are all who need be named " on this occaſion, and ought to make us bow down our heads. " Should you aſk me, if ſuch a dominion over the paſſion is poſ- " ſible in nature? I anſwer frankly, Yes; becauſe I am a wit- " neſs myſelf of the poſſibility of it, from many inſtances; one " of which I will relate. In the year 1714, (if I am not miſtaken) " in an opera that was performed at Ancona, there was, in the " beginning of the third act, a paſſage of recitative, unaccom- " panied by any other inſtrument but the baſe; which raiſed, " both in the profeſſors and in the reſt of the audience, ſuch and " ſo great a commotion of mind, that we could not help ſtaring " at one another, on account of the viſible change of color " that was cauſed in every one's countenance. The effect was

Remarkable effect of muſic.

" not of the plaintive kind: I remember well, that the words
" expreſſed indignation; but of ſo harſh and chilling a nature,
" that the mind was diſordered by it. Thirteen times this drama
" was performed, and the ſame effect always followed, and that
" too univerſally; of which the remarkable previous ſilence of
" the audience, to prepare themſelves for the enjoyment of the
" effect, was an undoubted ſign.

§ 92.
Want of principles amongſt the moderns.

" I was too young to think of preſerving a copy of this paſ-
" ſage, and have ſince been very ſorry I did not. That the
" compoſer, though excellent in his time, knew by principle that
" ſuch an effect would be produced, I do not believe; but I be-
" lieve, that, being a man of very fine taſte, and great judgment,
" he was led by good ſenſe, and by the words, and had, on that
" occaſion, accidentally hit upon the truth of nature. From
" hence I conclude, that if we know how to give a beginning to
" commotion, on the other hand, we have not principles to guide
" us in the progreſs. The fact is, that in ſmall movements, and
" for a little time, a lucky hit of this ſort oftentimes happens
" amongſt compoſers; but there is no rule nor ſcience to attain
" this end in many movements, and for a conſiderable time.
" This is all that I can advance with certainty upon the ſubject
" before us, and the poſſibility of the facts reported, in relation
" to the antient modes of muſic.

§ 93.
Modern modes.

" As to our modern modes, which are alſo called tones, al-
" though we know their nature with certainty, yet it is not ſo
" clear what their number is. Common practiſe, and eccleſi-
" aſtical cuſtom, have eſtabliſhed eight; Zarlino pretends that
" there are twelve; others are of another opinion. But their
" number is of no conſequence for the preſent purpoſe; it is
" ſufficient that we know their formation and nature. Theſe

“ conſiſt intrinſically in the common diatonic ſcale, conſidered “ in the full extent of the octave, in its harmonic and arithmetic “ diviſion, and in the diverſity as to the place of the hemitones “ in the ſcale; which diverſity does not, nor can, proceed from “ any other principle, but that of beginning the ſcale with different notes.”

This diversity is
somewhat wrong
than the pitch

§ 94.
Old Italian modes.

Tartini proceeds to ſhew the eight modes uſed by the old Italian maſters; four of which ariſe from the harmonic diviſion of the octave, and are what they called authentic; the other four are what they called plagal, and ariſe from the arithmetical diviſion of the octave. “ There were certain rules and laws,” ſays he, “ for the ſong, and the reſpective cloſes; ſo that, from the ſinging part and the cadence, every tone is known. This is the “ ſubſtance of our modes, or tones. Neverthelesſ, I have found “ the adjective Dorian annexed to the firſt tone, with theſe words, “ *adapted to the grave affections*; Hypodorian to the ſecond, “ *adapted to inſpire cheerfulneſs*; Phrygian to the third, *adapted* “ *to excite anger*; Hypophrygian to the fourth, *adapted to bring* “ *on tranquillity*; &c. You will eaſily believe that I am not perſwaded of theſe effects; on the contrary, I am perſwaded that “ theſe modes have no connection with thoſe of the antients; “ and I am moreover perſwaded, that their inſtitution is not perfectly right.”

§ 95.
Number of modes.

Our author then proceeds to prove this laſt allegation in the cleareſt manner; and ſhews, that the number is really eight, and no more; but not the ſame which the old Italians made uſe of. Both C and A may be either authentic or plagal, i. e. with an harmonic or arithmetical mean. D and F can only be authentic; laſtly, E and G can only be plagal. Thus has Tartini cleared up, in a ſhort manner, that which has ever been a matter of debate amongſt muſicians, who had no principles to guide them.

§ 96. *Antient and modern modes compared.*

" But this," ſays he, " only by the bye. I now return to my " firſt point; which is, to ſay the truth, not to diſcover, but " rather to give my conjectures about, the antient modes; to " explain the modern modes; and to compare them together. " But the antient ones are in a higher degree more difficult to " explain, than the moderns are eaſy; and therefore their com- " pleat compariſon is impoſſible; for which reaſon, this chapter " ought to end here. However, as in obedience to your com- " mands I am obliged to proceed, whatever I ſhall add, ſhall be " faithfully diſtinguiſhed into proper claſſes, of certainty, doubt, " and opinion.

§ 97. *Muſic ſhould be ſubſervient to proſody.*

" To begin with what is certain. The firſt thing then is, what " I ſaid before, that the antient modes were totally different " from ours. I do not take any merit to myſelf in proving this, " becauſe this has been proved over and over again; however, " the method I ſhall take will be different, and will ſerve to lead " me to ſomething of importance. Firſt then, the intervals of " the antient modes are totally different from ours: Ariſtides " enumerates ſix of theſe modes; (it is not worth while to give " them, at length, with their names;) in all which there ought to " be the enharmonic dieſis; whereas our modes, being founded " on the diatonic or common ſcale, neither have, nor can have, " ſuch an interval; which is entirely unknown amongſt us, and " which we cannot execute. The antient modes were ſo rigorouſly " joined to the proſody, that the people could diſcover the miſ- " takes, if there were any, committed by the muſical poet, in " the length and ſhortneſs of the ſyllables, both in relation to the " poetry and the muſic. This is a point of hiſtory in which all

" writers agree; this gives us an idea quite different from what " our modern modes, and our muſic in general, furniſh: For, " to ſpeak freely, we make the proſody ſubſervient to the muſic, " not the muſic to the proſody. Nay farther, by the laws pre- " ſcribed to the antient muſicians, to preſerve rigorouſly in the " muſic the quantity of ſyllables, it was impoſſible to protract " a vowel, in ſinging, beyond the time which belonged to " the ſyllable: We, on the contrary, prolong the vowels " through many bars, although they are oftentimes ſhort; as in " amen, adoro, &c."

§ 98.

The ſame ſubject continued.

I cannot help expreſſing, on this occaſion, my perfect agreement with Tartini, that nothing ſeems more contrary to order, than the method, mentioned by him, of making the proſody ſubſervient to the muſic. It ſeems to me impoſſible to produce the proper effect of vocal muſic this way; and muſicians, who have any regard to their reputation, ought never to indulge the vanity of a poet, who will, without running any riſk to his own character, undertake ſuch a taſk. However, if it ſhould ever be neceſſary, for particular reaſons, to ſet words to muſic, the poet ought never to make uſe of rhyme; which, by the bye, is ſo much labor loſt, in all muſical dramas; for who ever reads the poetry without the muſic, except the author? When free from theſe ſhackles, the poet has certainly a much better chance of ſucceeding, at leaſt in a tolerable degree; but then he ought to be very exact in the metre.

§ 99.

Proſody rigorouſly obſerved.

" You will aſk me," continues Tartini, " If it is really poſ- " ſible to preſerve rigorouſly, in muſic, the quantity of ſyllables? " I anſwer, That it is poſſible, not only in the genus, but in the " ſpecies and individual alſo; becauſe, as was ſaid before, in " the value of muſical notes there is every thing neceſſary for

“ the purpoſe. Nevertheleſs, we muſt diſtinguiſh, Either the value of the ſyllable is taken with the utmoſt rigor, or with a latitude: If with rigor, it is paſt all doubt, that one long ſyllable is equal in value to two ſhort ones, juſt as a minim is equal to two half-minims; and one of theſe is equal to a crotchet, &c.” Tartini then ſubjoins an inſtance of the rigorous method, in a verſe of Virgil, ſet to notes, both in common and triple time.

§ 100.

Obſerved with diſcretion.

“ With theſe examples,” ſays he, “ I mean nothing more, than to ſhew what progreſs of muſical notes reſults in each of theſe times, when they are reduced rigorouſly to the value of the ſyllables: But I do not pretend, that the ſyllables, diſpoſed in ſuch a manner by the meaſure or bar, ſhould correſpond exactly to the ſenſe of the muſic; as would follow, from what was ſaid in the preceding chapter, relating to the long and ſhort accents of the meaſure. Whether this was the practiſe of the Greeks, is more than I know; but ſomething like it muſt have been the caſe, by abſolute neceſſity, if it was neceſſary that the long ſyllables ſhould be diſtinguiſhed from the ſhort, in their muſic. But my opinion is, that the meaſure amongſt the Greeks was obſerved, not rigorouſly, but with diſcretion. If they were real imitators of nature; and if, by the means of poetry joined to muſic, they raiſed and calmed the paſſions; they muſt of neceſſity have attended to what happens in common diſcourſe. When this is animated by paſſion, the natural effect is, in proportion to the paſſion, a greater or leſs inflexion of the voice; a greater or leſs pitch and force of tone; a greater or leſs lengthening of words and ſyllables, &c. In the expreſſion a word of more ſignificance occurs: This, without any reflexion, is placed in a ſtronger point of light than others, by hurrying

“ over it, if the paſſion is anger; by dwelling upon it, if the paſſion is grief; &c.

§ 101.

How the paſſions are to be imitated.

“ The muſical poet, if he was alſo a philoſopher, being obliged to conform to nature, muſt have met with many caſes, where the long ſyllable ought to be lengthened, the ſhort ſyllables ſhortened, without regard to their rigorous natural value, in order to expreſs the paſſions properly; and that in compariſon with the natural value of other ſyllables, which were not ſubſervient to the paſſion, unleſs in preparing the mind for it. A diſcretionary, therefore, and not a rigorous, regard to bars was neceſſary: If ſo, their muſic reſembled the recitative of our Italian operas, in which the bars are diſcretionary; nay, it can hardly be perceived that there are any bars at all. Thus it ought to be, if we undertake to imitate the nature of any paſſion; which, however conſtant it may be, will not admit of having its motions, which by their nature are unequal, regulated by equality. No ſeries therefore of equal bars can correſpond to ſuch an idea; nay, the change of time from common to triple, or the contrary, cannot correſpond to it; becauſe in all the variations of time, there is ſtill the equality of movements that conſtitute the time. In ſimple narration there may be an equality of movements, and conſequently, there may be regular bars rigorouſly obſerved. If it is true, as I think it is, that in order to affect others, we muſt ourſelves be affected, there are very few narrative parts, which, if we follow nature, will admit of being regulated by an equal movement; becauſe there are few ſuch parts totally free from paſſion.”

§ 102.

Diſcretionary meaſure.

“ I am confirmed in my opinion, by obſerving that diſcretionary meaſure not only can never be of prejudice to the value of ſyl-

“ lables, but, on the contrary, helps infinitely to determine their quality, if we attend to one rule only; which is, to give in every caſe at leaſt a double quantity of time to a long ſyllable, in proportion to what is given to the ſhort one. Who can doubt, if to the word Barbara a minim and two crotchets are ſet, whereby the dactyl is rigorouſly expreſſed as to time; and to the ſame word a minim and two quavers are ſet, which is the diſcretionary time; but that the firſt ſyllable is long; the like may be ſaid of the two ſhort ſyllables? On the contrary, we ſhall be more certain of the value of the ſyllables in the ſecond way than in the firſt. Hence ariſes an infinite advantage to the muſical poet, for imitating nature with the greateſt eaſe. And if we, having the ſame end in view, ſhould follow this method, why will we imagine the Greeks did otherwiſe? Hitherto, I think, I have not deviated from what I propoſed; which was to compare the antient modes with the modern; becauſe, the compariſon being abſolutely neceſſary, in order to diſcover what kind of muſic it was that conſtituted the antient modes, what I have ſaid, and what I ſhall ſay, of a like kind, muſt belong to my ſubject. This notice becomes abſolutely neceſſary, becauſe, in purſuing the compariſon, I ſhall give myſelf up to be guided by nature and reaſon, till I come to comprehend what both one and the other means. I ſhall adhere cloſely to my argument in the ſubſtance, perhaps not in the order. But to proceed.

§ 103. *Simultaneous notes.*

“ To our modern modes is joined ſimultaneous harmony, formed by the union of different voices, baſe, tenor, contralto, and ſoprano. You know I am no ſcholar; nevertheleſs, by good luck, I am not unacquainted with the famous diſpute, whether the antients knew and practiſed harmony in our ſenſe of the word. In this queſtion, we muſt neceſſarily recur to the

" common fountain, which is nature. The human ſpecies is the " ſame, the paſſions are the ſame. In this caſe, their different " modifications, relating to times, cuſtoms, laws, education, " government, &c. being of no importance, and it ſufficing for " our preſent purpoſe, that the foundation is the ſame, I think " I ſhall not be miſtaken, if, upon this ſure foundation, which " the Greeks had in common with us, I advance the following " propoſition; That, if ſimultaneous harmony was known to the " Greeks, they could not, and ought not to uſe it, in order to " arrive at the end they propoſed; but ought to employ a ſingle " voice in their ſongs.

§ 104.

Effect of ſimultaneous notes.

" If the intent of the Greeks was to excite, not any general affection, but a particular and ſpecific paſſion; it is as certain " as that nature cannot err, that every paſſion has its particular " movements, and its particular tone of voice. I will take for " an example the moſt univerſal and moſt oppoſite paſſions, joy " and grief: Joy has its ſprightly movement, and its intenſe and " acute tone of voice: Grief has its ſlow movement, and its " low and languid tone; and this in general. In proportion to " the greater or leſs degree of each reſpective paſſion (as long as " it remains within its limits and in its nature) both movement " and voice alter likewiſe. This is the courſe of nature; and " every one of us knows, from his own experience, that what I " ſay is true, if he does but reflect. Now, I aſk, How is it poſſible, according to nature, that the harmony of four voices, " the extremes of which are the baſe, and the ſoprano, ſhould " ſucceed in exciting properly to mirth, when there is an intrinſic oppoſition in the conjunction of acute and grave; one " belonging to mirth, the other to cheerfulneſs? But it will be " ſaid, that this defect is ſupplied by movement, which for that " purpoſe may be ſprightly in the ſoprano. This is very well

" for one part, but ill for the whole; becauſe a certain movement and a particular voice belong to every paſſion; not a " movement ſeparated from the voice, nor a voice ſeparated " from the movement. This, I believe, is the cauſe of what often " happens, when we hear a well-compoſed and well-executed " muſical performance. We cannot deny that we feel in ourſelves a beginning of commotion, in general, of the nature of " the paſſion intended to be raiſed; but as for the progreſs and " ſpecific determination of it, I have never known it, becauſe I " never felt in myſelf the intire effect: My own opinion is, that " ſuch a progreſs is impoſſible, and ſuch a compleat effect, on " account of the contraſt above-mentioned between the extreme " parts of the harmony; becauſe, being extremes, and conſequently of a general nature, it is impoſſible they can unite together, ſo as to produce a particular effect. The effect " will be general, as is the cauſe. There will therefore be a " tendency towards a certain paſſion; there will never be a " paſſion ſpecifically determined.

§ 105. *Simultaneous notes more particularly conſidered.*

" I muſt add, to come to particulars, that ſuch a movement " and ſuch a voice ought to be joined to a ſong adapted to a " particular paſſion. To confine myſelf to the diatonic ſcale, " in which the Greeks and the moderns agree, and which is " ſufficient for our preſent purpoſe: A proper ſong cannot be " compoſed but with a certain number, and certain kinds of intervals; hemitone, tone, the two 3ds greater and leſſer, the 4th, " the 5th, the two 6ths greater and leſſer, the two 7ths greater " and leſſer, and the octave. Theſe are all. The reſt is only " repetition and complication. The intrinſic nature of theſe intervals, and particularly of the ſimple ones, that make up the " whole harmony, i. e. the octave, the 5th, the 4th, the two " 3ds major and minor, is not uniform; it is different; and

“ that in ſuch a degree, that uſing one interval or another in the compoſition of the ſong, makes a very ſenſible difference in the effect. Let us ſuppoſe then, that in general the interval of the 3d major correſponds with mirth; and therefore let a ſong be compoſed, to the baſe of which belongs ſpecifically the 3d major; let the filling up in general conſiſt of 3ds major and minor, and let the marked accent, by vertue of the bar, fall on the above-mentioned 3ds; ſo that they may become more perceptible; let alſo the movement of the ſong be quick, and let it be ſung by a ſoprano, that there may be all the neceſſary conditions poſſible. Such a ſong will have, by ſuppoſition, every thing proper to excite mirth. Put it now into harmony, and it is certain, that while the part of the ſoprano paſſes ſucceſſively through the intervals of 3ds, the harmony of the baſe, tenor, and contralto, will proceed ſimultaneouſly and ſucceſſively through the intervals of octave, 5th, 4th, 6th, tone, hemitone, &c. according to the different diſpoſition of the voices that fill up the harmony, and according to the different paſſage of the baſe from one tone to another. Now, how is it poſſible, that, in ſuch a contraſt of ſo many different ſimultaneous intervals of harmony, which muſt have more force than ſucceſſive intervals of the upper part, ſhould produce the effect for which the ſong was formed? It is not enough, to ſay, that the ſoprano, as being in the extreme, and conſequently more intenſe and over-ruling, will be heard diſtinctly in compariſon of the other voices, and therefore will produce its effect. This propoſition is falſe in harmony. Three voices againſt one will prevail, although the ſingle voice be more intenſe, the three more remiſs. This is certain in practiſe, when the voices are proportionate. But let us grant the propoſition: I aſk, if, whether in favor of the voices joined in order to compleat the harmony, there will or will not be

" a diſtraction in the mind of the hearer, as being forced to
" liſten both to the principal voice and its aſſociates? It cannot
" be denied, there will certainly be a diſtraction; and this is ſuf-
" ficient to deſtroy the main intent.

§ 106.
Simultaneous harmony inconſiſtent with expreſſion.

" It is not a light taſk to undertake to raiſe, by the means of
" poetry and muſic, a determinate paſſion. I, for my own part,
" believe it is much more difficult than that which an orator
" undertakes, when he attempts to move and perſuade; nay,
" I believe it to be the moſt difficult taſk, that can be undertaken,
" in the whole compaſs of human affairs. To obtain this, it is
" neceſſary for the muſician to bring the human mind to a per-
" fect attention, nay, to an intenſeneſs of attention. It is im-
" poſſible to attain this, as long as there is the leaſt diſtraction;
" this is a truth which I have from nature; it is no production
" of my own brain: It is therefore impoſſible to excite ſuch a
" determinate paſſion, by the means of a ſong joined to harmony,
" in our ſenſe of the word; and at moſt, as I ſaid above, a be-
" ginning of commotion in general is all that is poſſible. If the
" Greeks therefore knew harmony in our ſenſe, they ought not,
" nor could they, avail themſelves of it, for the end they had in
" view; becauſe, in regard to principles of nature, in which all
" men certainly reſemble one another, we ourſelves, who know
" harmony, muſt be conſtrained to exclude it, and make uſe of
" a ſingle voice, if we propoſe to attain the ſame end.

§ 107.
Greeks did not uſe ſimultaneous harmony.

" I have often uſed the expreſſion, *harmony underſtood by*
" *the Greeks in our ſenſe of the word.* I will explain myſelf.
" It cannot be denied, that the Greeks in ſome ſenſe underſtood
" harmony; becauſe in their hiſtories, their philoſophy, their
" monuments, this word continually occurs. But farther; They
" called the octave, the 5th, the 4th, conſonant intervals; and

" all intervals leſs than the 4th, diſſonances. Their harmony " therefore was not, like ours, compoſed of ſimultaneous, but " ſucceſſive notes; and they meant (to ſpeak in our way) that " the paſſage to the 4th, 5th, and octave was harmonious, and " conſequently conſonant; and that the notes which fill up the " 4th were diſſonant. They had therefore formed their tetra- " chords, or paſſages to the 4th, as props of conſonant har- " mony; and theſe, according to the different genera of muſic, " viz. diatonic, chromatic, and enharmonic, were filled up with " different diviſions."

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§ 108.

Whether ſuch muſic is beſt can ſcarcely be doubted.

I doubt not but that many people will be amazed to find Tartini ſpeak ſo ſtrongly againſt ſimultaneous harmony, and be apt to look on all he has ſaid, or can ſay, as not worth their notice: But I deſire that they will conſider this as the opinion of a man perfectly well qualified to judge, both from his ſituation, and his extraordinary genius for muſic; and that it is probable, nothing but conviction could induce him to ſpeak in this manner, conſidering all the prejudices that muſt naturally lie on the other ſide of the queſtion, from the prevailing faſhion in his own country; where muſic flouriſhes more than in any other part of the world, and where genius is more able to cover defects, if they can be covered, by the elegance of the compoſition and the brilliancy of the execution. His authority, therefore, ought at leaſt to go thus far, viz. to make us ſuſpend our judgment till a fair trial has been made: Nay, I may ſay, that ſomething like a trial has been made; and, when it has been made by a compoſer of genius, has always ſucceeded. Thoſe feelings of nature, which, as Tartini obſerves, are and muſt be common to us and the Greeks, have of late years put the Italian maſters upon working the parts leſs in their opera muſic; and have produced thoſe thrumming baſes, as they are called by our harmoniſts, by way of ridicule.

Operas

§ 109.
Old church-muſic.

Operas ſucceeded the old church muſic, where the parts were worked with great judgment and labor, and where they produced a great effect, as none of the common paſſions were to be excited, and only a pomp of ſolemn and grave harmony was or ought to be expected; for I look upon the *miſerere's* and *ſtabat mater's* of later maſters to be deviations from the genuine old church ſtile. I can for myſelf ſay, that I never was ſo little pleaſed with muſic, as with what I heard in the churches in Italy; it being ſo ill ſuited to the ſolemnity of the place, and the occaſion; and ſome of my friends expreſſed the ſame ſentiments: So that, as church-muſic at firſt carried a bad taſte into opera-muſic, the reverſe afterwards took place, and church-muſic now ſuffers, in its turn, from the influence of its faſhionable rival.

§ 110.
Corruption of church-muſic.

The laſt-mentioned perverſion of muſic is of more conſequence than the former, and much more blameable. If we are ſuffered to enjoy perfect tranquillity at the theatre, while the ſinger, or at leaſt the compoſer, means to plunge us into all the tumult of varying paſſions; the hurt is not great. But in the church, to ſubſtitute gay airs, or paſſionate expreſſion, in the room of ſolemn muſic, is a perverſion that defeats the great end for which muſic was firſt inſtituted, as appears by the unanimous teſtimony of hiſtory. We know that this was the caſe amongſt the Jews; and it is no leſs certain, that it was the caſe amongſt the pagans. I ſhall content myſelf with producing one ſingle proof of this aſſertion out of Plutarch; who ſays thus, Vol. II. p. 1140: 'Amongſt the Greeks, in antient times, theatrical muſic was 'not ſo much as known. Muſic then was wholly employed 'for divine worſhip, the inſtruction of youth, and the praiſe 'of illuſtrious heroes; and again, p. 1131, it is a part of 'piety, and even a principal duty of man, to ſing hymns to 'the gods, who have given to man alone an articulate voice.'

Chap. V.

§ 111.

Old Italian muſic.

I now return to my author, who having ſhewed, in a way peculiar to himſelf, that the Greek muſic turned entirely upon the tetrachords, which he properly calls the props of harmony, proceeds thus: "We have many examples in the "old church-muſic, which is all of the diatonic kind, of "cadences formed by the hemitone major deſcending. I "ſhould be apt to think, that, amongſt the antient ſongs, there "are ſome genuine ones according to the example of the Greeks, "if it was not for the entire contraſt between the muſic and the "proſody. It muſt be owned, that there are ſome ſo full of gra- "vity, majeſty, and ſweetneſs, joined to the moſt perfect mu- "ſical ſimplicity, that we moderns ſhould find it a very hard "taſk to rival them. An inquiry into their date is of little im- "portance; their muſical nature is all we want. It is certain "then, that they were made for a ſingle voice; if this voice was "multiplied by the uniſons of a whole people, that does not de- "rogate from the deſign of the inſtitution; becauſe uniſon is in "its ratio only one voice; that they are ſimple in the higheſt "degree; that they partake of the nature of recitative, but largo; "that many of them are like canzoni, or ſongs, many of a mixt "nature; that none are confined to regular bars, but diſcretionary; "and that in each of them the key is determined, and is limited "by a convenient extent, as to grave and acute." This idea is in general conformable to nature; and, with regard to the univerſality of circumſtances, it is impoſſible to contrive with more ſimplicity; nor could the Greeks themſelves have contrived or intended otherwiſe.

§ 112.

Idea of the Greek muſic.

"The Greeks being, with reſpect to us, the firſt inſtitutors "of muſic, it follows, that they ſet out with this idea of ſimplicity; becauſe, however capable men may be of uſing art "and refinement, yet, in the firſt invention and inſtitution

" of things, it is certain, that nature does all, art nothing; " which itſelf has no exiſtence, but upon the data of nature. " In this univerſality of muſical ideas, I hold for certain, that " the antient modes of the Greeks agreed with our old Italian " modes, which I muſt here diſtinguiſh from our preſent modes. " Of theſe laſt, I ſhall ſoon give an account. The ſpecific " difference of the antient Greek modes conſiſts in the preciſion " of movement, which we may call the breaking of muſical " notes, according to the different value of ſyllables; in the pre" ciſion of chooſing a certain voice in relation to grave and " acute, which we will ſuppoſe to have been baſe rather than " tenor, tenor rather than contralto, &c.; in the preciſion of " certain intervals, as props or reſts of the ſong, and of thoſe " leſſer intervals (we may call them ſcales) which ought to fill " up the greater, and to be limited to a certain extent; in " the preciſion of the manner of expreſſion, which is different " in every different mode, (we call it taſte) according to the " nature of the paſſion intended to be raiſed; in the preciſion " of a certain inſtrument to accompany the voice, ſuch as " ſuited the mode and the paſſion. Theſe are all the dictates " of nature; but I do not undertake to enumerate them all. " Add to this, that amongſt the Greeks the muſician was joined " to the poet, the poet to the philoſopher; and that the ſame " perſon, being muſician, poet, and philoſopher, treated natural " ſubjects in conformity to nature, amongſt a people lively, " cultivated and intereſted in the ſubjects themſelves."

§ 113. *Unknown or deſpiſed by the moderns.*

Tartini, in the preceding paſſage, has given a moſt formidable liſt of requiſites to qualify a man to produce any thing extraordinary in muſic. If we are not to look upon our author as a mere enthuſiaſt, a modern compoſer, one would think, muſt be very full of himſelf, who would not bluſh when he examines his own works by the rules here laid down. However, human nature is wonderfully ready at finding out reaſons for ſelf-complacency; and here the expedient is at hand; for almoſt every man compares himſelf with the rival of his own time; his ambition looks no farther; and 'tis a thouſand to one, if he ſhould deign to look backward, that he pities the ignorance or bad taſte of former ages, inſtead of trying to gain inſtruction from them. But to return to my maſter.

§ 114.

Roman muſic not ſo perfect as the Greek.

" I am far from thinking that muſic paſſed from the Greeks " to the Romans with the idea I have given; much leſs from " the Romans to us. From thence ſprung its declenſion and " total deſtruction. What remained, amongſt our old Italians, is " only the material ſubſtance, ſtript of the greateſt and moſt " important parts of the above-mentioned preciſions. That in " the modes of the old eccleſiaſtical hymns is preſerved faithfully, " and with preciſion, the nature of the mode, according to the " reſpective rules eſtabliſhed, is certainly true; but there wants " ſomething more; for it is not proved, that they are the rules " which the Greeks followed. For the reſt, the movement, or " breaking of the notes with a proper ratio, and the proſody determined for a certain effect; the determinate aſſignment of the " ſong rather to a ſpecific grave, than to a ſpecific acute voice, " and the contrary; the choice of certain intervals, rather than " others; the expreſſion of the ſong, rather in this than in that " manner; the choice of the inſtrument proper for the mode; all " theſe things from that time were neglected, and have never been " thought of ſince. What we have added of our own are, ſimultaneous harmony, i. e. the combination of many voices together; the modulation; and a fine manner or taſte. As to the " effect which our harmony can produce, in reſpect to the purpoſe of exciting the paſſions, I have, in my opinion, ſufficiently

“ proved, that it can have none in particular, as it ought to have.
“ What effect our modulation can produce is now to be con-
“ ſidered.

§ 115.
Modern modulation.

“ I have above diſtinguiſhed the old Italian modes from our
“ truly modern ones. The diſtinction was neceſſary, in regard
“ to the modulation, which, as I have obſerved in another place,
“ and you very well underſtand, means the paſſing from the tone
“ propoſed to a different one; but which has relation to the tone
“ firſt propoſed. It is not ſufficient, for the preſent purpoſe, to
“ give a general explication; it is neceſſary to come to particu-
“ lars, in ſuch a manner as to convey a compleat idea of it, and
“ that too ſcientifically; becauſe it is an eſſential part of our mo-
“ dern muſic, and therefore ought indiſpenſably to have a place
“ in this treatiſe. This then will be a proper place, as being
“ neceſſary here, in order to make a compariſon between the
“ modes.

§ 116.
The ſame ſubject continued.

“ The principal foundation of our modes ariſes from the very
“ three notes of example 3, fig. 1; upon which we ſaw the har-
“ mony was founded; from whence the common diatonic ſcale
“ was deduced. The foundation is the beſt poſſible, becauſe it
“ is reduced to the numbers 6, 8, 9, 12, and therefore is a foun-
“ dation common to us and the Greeks. The notes expreſſed
“ by theſe numbers are, *c*, G, F, C. Take away the firſt, as not
“ neceſſary, as being only the octave, and there remain *c*, G, F,
“ which are ſuppoſed to be firſt or primary baſes in the 3d major,
“ as has been demonſtrated in its place. To every note let its
“ relative, with a 3d minor, be aſſigned; and all put together
“ will be *c*, A, *g*, B, *f*, D. Theſe ſix notes, deduced as was men-
“ tioned, and underſtood as firſt baſes, are the whole foundation
“ of our modulation; which may wander and circulate through

" any of the above ſix notes, by transferring the ſcale and the harmony of C; which, relatively to the example, is the principal tone propoſed, and in which the harmony ought to begin and end; to G and F for the harmony of the 3d major, and again, by transferring the ſcale and harmony of A; the relative note with a 3d minor to C; into E and D, for the harmony of the 3d minor. Hence ariſes in our compoſitions a prodigious number of muſical accidents; and therefore we deviate from the diatonic ſcale; becauſe G and E have a dieſis, or ſharp, in the key; F and D a ♭ molle, or a flat. By modulating in the afore-mentioned notes, and determining by harmonic cadences the tone ariſing from the ſcale, and from the harmony relative to them, the occurrence of theſe reſpective accidents, and the employment of them, are inevitable; and this the ſubſtance of our modulation. The order of it is not eſtabliſhed by fixed and certain laws, and in general it is regulated by the ſentiment of the compoſer; though, indeed, it may be ſaid, that ſentiment brings us acquainted with many truths, which ſerve afterwards for laws.

§ 117.

The paſſage from the principal tone to the 5th natural.

" The paſſing, in the modulation, from the principal tone with a 3d major, to the 5th of the tone, is pleaſing, according to common ſentiment; and therefore that is made a rule. This rule is founded on principle, and conſequently can be accounted for. The tone with a 3d major is by its intrinſic nature harmonic; therefore the paſſage of the modulation, from the principal note to the 5th, is conformable to the nature of the harmonic ſcale; becauſe the paſſage is from the extreme to the mean. From this moſt certain principle it happens, that when, by the modulation, the tone, ſenſe, and period are once ſettled, all men, by the force of natural ſentiment, feel the repugnance that occurs, in paſſing with the modulation from

“ the principal note of the tone with a 3d major, to the 4th of the tone. This repugnance ariſes from the contrariety of nature. The 4th of the tone divides the octave of the tone arithmetically. If the tone is with a 3d major, which is harmonic by nature, we ought to feel a repugnance: If the tone is with a 3d minor, which is arithmetical by nature, we ſhall perceive no repugnance. It is true, that this repugnance does not ariſe from any defect that is in the original plan, or in the compoſer. The tone of C is compoſed of two natures, harmonic and arithmetical; and therefore the modulation may rightly proceed through the two means, harmonic and arithmetical. However, when there are in the ſame tone the two modulations, the compariſon that ariſes neceſſarily, from their being near to one another, diſcovers the perfection of one, and the imperfection of the other, and makes us perceive the repugnance.

§ 118. *Modulation ſhould be by eaſy tranſitions.*

“ In general, if we attend to the nature of the tone, and to the neareſt relative notes, ſo that the modulation may proceed by ſteps, and not by jumps; (it would be, for example, a jump, and not a ſtep, in modulation, to paſs without a proper medium from a tone with ♭ molle to a tone with a dieſis *, and the contrary); if we attend to the keeping of the modulation more in the principal tone, than in the acceſſory and relative tones; the contrary of which is often ſeen; and particularly in a diſtinct manner at the beginning and end of the compoſition; with theſe precautions our modulation would be compleat. But it would lead me too far out of the way, to enter fully into this ſubject; and therefore let the general idea I have given ſuffice for the preſent purpoſe.

§ 119. *Modes of the 15th century different from ours.*

“ What we find in the church-muſic, in the harmony, and in the ſongs according to the modes of the 15th century, is very

" different from our modulation. We find there no modulation, " but what intrinſically belongs to the tone propoſed; and all " the muſic of thoſe times remains perfectly and rigorouſly in " the diatonic ſcale; and therefore no muſical accidents whatever " are found in it, except the dieſis neceſſary to the 7th note of " the ſcale in the 3d minor, in order to form the harmonic cadence " in the tone propoſed; which always remains the ſame " throughout the whole compoſition. If we compare theſe two " manners of muſic together, we ſhall find, that the old Italian " manner was graver, more majeſtic, and ſevere, than ours; ours " more varied, and prettier. If we compare both theſe Italian " manners to the antient Greek ones, I hold for certain, that " the old Italian manner approached nearer to that of the Greeks; " and this is eaſy to conclude, from what has been already ſaid. " Our modulation is very complex, and our ideas correſpond " with it; for, in general, the compoſition which has the greateſt " variety in a modulation, kept within reaſonable bounds, is moſt " eſteemed amongſt us. I muſt confeſs, that both in Italy and " elſewhere, there are ſome moſt excellent maſters in this way, " whoſe ſkill raiſes my admiration, and affords me an opportunity " of improving. But I doubt with reaſon whether or no " this ſkill of theirs is conformable to nature.

§ 120. *Taſto fermo.* " Two things I have obſerved for ſome time paſt, with attention " and reflexion. In our muſical compoſitions, after the " modulation has wandered about through the tones, now and " then, towards the end, a taſto fermo is formed in the fundamental " baſe for many bars together; and upon this baſe the " modulation goes on with various accompaniments, of which " the ſame principal note continues to be baſe; and therefore " the modulation remains in the ſame tone, of which the taſto " fermo is the firſt baſe; which, for that reaſon, can only be " either the 5th, or the principal note in the tone propoſed.

" Whatever the modulation may be, it muſt neceſſarily be extremely ſimple, although diſcordant accompaniments be intermixt; becauſe it is finally regulated and ſupported by one ſingle baſe note.

§ 121.
Effect of the taſto fermo.

" I have obſerved, on various occaſions, one conſtant effect from it: The ſame audience, which frequently gave little or no attention to the compoſition, I have always ſeen attentive to the harmony of the taſto fermo. Let this be examined, and, if it be found true, let it be allowed, that my obſervation is founded on nature. My other obſervation is common to all nations, where our modern muſic is uſed. Every one of theſe nations has its popular ſongs, many of which are of antient tradition, many newly compoſed, and adopted by common conſent. In general, they are extremely ſimple; nay, it may be obſerved, that the moſt ſimple are moſt in vogue. It is certain, that in theſe there cannot be much modulation, at moſt in the 5th of the tone. That the people liſten with greater pleaſure to one of theſe ſongs, than to the moſt exquiſite ſong modulated through all the maze of harmony, is an obſervation as eaſy to make, as it is ſignificant when verified. But it will be ſaid, the effect is equivocal, becauſe it may as well proceed, and perhaps will proceed, more from the words of the ſong, which are intereſting, than from the muſic. I anſwer, that let the ſame words be joined to the ſimple ſong, and to another exquiſitely modulated, according to our art; and let the ſame muſician ſing both one and the other; yet ſtill the judgment will certainly be in favor of the firſt ſong. I repeat what I have ſaid elſewhere; nature has more power than art: and I add with frankneſs, that the greateſt and beſt part of muſic is diatonic, but the moſt difficult to treat well, preciſely by reaſon of its extreme ſimplicity, as being neareſt allied to nature.

"If this is ſo, our modulation has made us deviate more from "the end at which the Greeks aimed, than the old Italians."

§ 122. *Simple muſic beſt.*

I believe moſt men, if they dared to ſpeak their own feelings, would talk the language of Tartini; but the dread of being thought to have a vulgar taſte, puts them under reſtraints, and makes them undergo the fatigue of ſilently liſtening, with a dozing kind of attention, if they are well-bred, and aſhamed to interrupt others, to what they are told is fine, but which they cannot, with all their endeavours, be brought to think agreeable; whereas many of our old ſimple ſongs ſteal our affections, in ſpite of all our prejudices, and even when we are almoſt aſhamed to be touched by ſuch low and vulgar things; but high-bred taſte, like high-born pride, is ſometimes forced to liſten to the humble dictates of nature, and enjoy a pleaſure it dares not openly avow. Since this is the caſe, it is no wonder that the Beggar's Opera pleaſed ſo much at firſt, and ſtill continues to be the darling of the nation; for I think there is a greater number of truly affecting ſongs in it, than can be picked out of many (I will not ſay how many) volumes of operas: But who dares own they like the muſic? Every body goes for the ſake of Polly and Macheath, and only bear the tunes. That this ſhould happen in our northern climate, where the ear is in general certainly not ſo delicate as in Italy, would neither be extraordinary, nor concluſive in favor of ſimple muſic; and therefore there wanted the expreſs teſtimony of the greateſt compoſer and performer in the climate moſt favorable to muſic, in order to convince us, that we do not judge as we do, or as I ſuppoſe we do, merely from the dullneſs and depravity of our organs. Let us then boldly ſay, with the Duke in Twelfth Night, Act II. ſc. 6.

'Give me that piece of ſong,
'That old and antique ſong we heard laſt night;

'Methought it did relieve my paſſion much;
'More than light airs, and recollected terms
'Of theſe more briſk and giddy-pated times.
'It is old and plain;
'The ſpinſters, and the knitters in the ſun,
'And the free maids, that weave their thread with bones,
'Do uſe to chaunt it.'

But I muſt obſerve, upon this occaſion, that there is a mongrel kind of ſongs, neither Engliſh nor Italian, which rowl through a parcel of unmeaning notes, without either rhythm or melody, and are of all muſic the moſt inſipid; having neither the ſimplicity of the old ballad, nor the delicacy of the opera ſtile; which laſt, for ſoothing the ear, is infinitely ſuperior to what is known in any other nation.

§ 123. *Good taſte.*

" There remains to be conſidered, what effects, in order to attain the ſame purpoſe of exciting the ſame paſſions as the " Greeks did, our fine manner, or what is called good taſte, " can produce. This conſiſts firſt and principally in the voice " of the ſinger, now lengthened and held out with ſweetneſs, now lowered or puſhed out with force, or ſuſtained, according as the paſſage requires, &c. 2dly, In appogiatura's, " trills, modes of breaking the time, either by ſhortening or protracting, modes of ſinging either natural or artificial, adapted " to what the ſong requires, &c. But, before I proceed farther " in my ſubject, I muſt caution you not to imagine I go upon a " falſe ſuppoſition, as it may appear that I ſuppoſe good taſte " to be an invention of our times. I own, it is neither an invention of modern nor of antient times; it is the product of " human nature. From the time that there was ſinging and " playing, nature itſelf, independently of art, has cauſed extraordinary productions in every age and every country; and "will continue to exert her privilege of doing the ſame, as long "as the world and the human ſpecies endure. Hence art was "derived; and I am certain that there has been, and muſt be, "good taſte, relative I mean to times and muſical modes, as an "eſſential part of muſic, ſo far as the execution is concerned. "My propoſition refers to our times, and our muſical modes, "and therefore is particular. If our mode of muſic is different "from the antient Italian modes, in proportion our good taſte "ought to be different from that of our anceſtors: If it were "otherwiſe, there muſt be a very eſſential and great error in one "of the two; it being utterly impoſſible, not only in nature, but "in art, that, two different ſpecies of muſic being ſuppoſed, "the ſame expreſſion and modification can agree with both. "The thing is ſo clear, that it would be loſt time to prove it. "But upon good taſte depend expreſſion and modification, and "theſe ought to be different: Therefore good taſte muſt be "different. I do not ſay, that its firſt and general principles "ought not to be uniform, in every mode of muſic whatever. "A voice excellent by nature, and perfectly well regulated, is "an univerſal principle; and, when nature is defective, the aſſiſtance of art becomes neceſſary; becauſe, in my opinion, "the univerſality and the greateſt perfection of good taſte conſiſts in the voice and expreſſion. This I call true good taſte, "according to nature; becauſe it agrees with every mode of "muſic whatever. Every thing elſe is particular, to ſuch a degree, that when we examine, without prejudice, the propriety "or impropriety of the uſe of trills, appogiatura's, cantabile "manner, &c. there will be found many caſes, in which none "of theſe things can reaſonably be uſed."

§ 124. *Abuſe of taſte.* I cannot help breaking in upon my author, in his excellent and truly ſenſible obſervations upon true taſte; a thing ſo little underſtood, that people are very apt to imagine, that it is the ſame in all the different modes of muſic; the contrary to which is clearly true; but I break in upon him, in order to prove how neceſſary it is to make the diſtinction he has made, in order to get rid of a very extraordinary innovation, lately introduced, of bringing the Italian manner into our old Engliſh ballads; which I am told, for I did not chooſe to hear ſuch an unnatural mixture myſelf, was practiſed on our ſtage; but, abſurd as this may be, Tartini will ſoon give us an inſtance, which will ſhew the rage of good taſte full as ſtrongly; for he continues, and ſays,

§ 125. *Abuſe of good taſte.*

“ In our churches, the Miſerere mei Deus is performed; and on the ſtage heroes and heroines go to death with the very fineſt muſical graces above mentioned. It is well that cuſtom and habit do not give room for reflexion; however, very little reflexion is ſufficient to turn all the pleaſure, that can be received from the moſt perfect execution, immediately into its contrary. The ſong adapted to the paſſion, the voice adapted to the ſong, both as to its natural quality, and as to the act of modification, as well as to its pitch, will always prevail, in every time and in every circumſtance. This is all that can be called general. If we deſcend to particulars, I underſtand very well the propriety of adapting our muſical graces to a great number of ſongs; but of the adapting of thoſe graces to all ſongs, I underſtand nothing, nor ever ſhall. I am too much perſuaded and convinced, that, in order to have a ſong truly adapted to the paſſion that is expreſſed by the words, every ſong ought to have its individual and particular modes of expreſſion, and, in conſequence, its individual and ſpecific good taſte. That the Greeks underſtood and practiſed in this manner was abſolutely neceſſary for their intent; a propoſition ſo true, in my opinion, that, had they acted otherwiſe,

" I would deny the fact, the hiſtory, and the poſſibility in na-
" ture. If we underſtand and act otherwiſe, the reaſon is, that
" muſic alone, and ſeparated from any other conſideration what-
" ever, is become our only aim and intention. This being pro-
" poſed as genus, ſpecies, and individual, and every thing being
" referred to that alone, our harmony, our ſongs, and our good
" taſte do exceedingly well. In this ſenſe, we have, here and
" elſewhere, moſt excellent compoſers and performers, whoſe
" ſkill pleaſes and ſuits the genius of all Europe; a moſt certain
" ſign, in general, that this is right in nature, for nemo omnes
" fallit. But, if the ſame end was propoſed as that which the
" Greeks had in view, we are very far from a poſſibility of ob-
" taining it with the means we uſe. Our harmony is in oppo-
" ſition, as including different ſpecies of grave and acute: In
" order to obtain their intention, one ſpecies only, individually
" belonging to the paſſion, muſt be employed. Our ſong is in
" oppoſition, as being modulated according to our art; as being
" unconfined by any reference to proſody, either in matter or in
" form; as not being obliged to chooſe intervals of a greater or
" leſs extent, as to high or low, nor tied down to the choice of
" a determinate voice.

§ 126.

How the paſſions are to be moved.

" If we would therefore purſue the ſame end which the Greeks
" did, we ſhould act quite contrary to what we do; we ſhould
" make uſe of one principal tone only; we ſhould regulate our
" muſic by our proſody, as to long and ſhort ſyllables, and
" particularly in reſpect to metrical feet proper for the paſſion;
" a thing as neceſſary as it is difficult; to which feet the ſong
" ought to correſpond identically: We ſhould uſe with preciſion
" certain intervals choſen with analogy to the nature of the paſ-
" ſion; (neceſſary alſo, but difficult;) we ſhould uſe a determi-
" nate extent of notes, as to grave and acute; and alſo a ſpecific
" voice,

" voice, rather grave than acute, rather in the middle than the " extreme; or the contrary, according to the nature of the " paſſion. But laſtly, our good taſte is in oppoſition to the end " the Greeks propoſed, as being juſt the ſame in every ſong " whatever, and as being formed of ſuch component parts as " carry with them an evident contradiction to nature, when ap- " plied to all circumſtances without diſtinction. Whereas good " taſte ought to vary perpetually, according to the different " paſſions; and ſhould be compoſed of ſuch minute component " parts, as are ſpecific and individual to the particular mode of " ſong required by the paſſion, and never transferrable to any " other mode. If the paſſion is mixt with other paſſions, as " frequently happens, in that caſe there is one generally princi- " pal and predominant, and this muſt be the chief object. If " two paſſions are equal in degree, which is poſſible, then in the " ſame ſong the object of the compoſer will be doubled, in pro- " portion to the force of the two different paſſions.

§ 127. *The difficulty of moving the paſſions.*

" I am entering too far into this affair before I am aware; " not too far, becauſe I doubt of the truth of the foregoing pro- " poſitions; but becauſe, great as the obſcurity of this affair " may be, they appear to me to reſult with ſo much preciſion, " that if you, my noble friend, were to require of me a muſical " example, deduced from them, it would be thought, that you " would have more reaſon to require it than I to deny it. But " ſoftly, I beſeech; my propoſitions are deduced from obſerva- " tion upon nature, common to the Greeks and us; and there- " fore are deduced from the firſt of all ſources. Their preciſion " therefore does not intrinſically ariſe from their deduction, but " from their adaption to the antient and modern modes compared " together. A preciſion of ſuch a kind is not ſufficient for the " purpoſe of exhibiting an example; a great deal more is wanting; a conjunction of three things in one is required; an habitual and ſpecific knowledge of the paſſions, ſkill in muſic, and talents for poetry; and therefore a philoſopher, a muſician, and a poet, each eminent in his way, are neceſſary.

§ 128.
The ſame continued.

“ But, beſides the foregoing requiſites, a diſpoſition in the audience, in general, to feel the effect is neceſſary; and alſo in particular, in different reſpects, as the being accuſtomed to ſuch a kind of muſic; for I am certain, that, without this, the ableſt muſician, that ever was among the Greeks, might ſing his beſt, without producing any effect, before a Dalmatian audience, whoſe muſic has no determinate intervals, but conſiſts in a continued effort of the voice in grave and acute, merely diſcretionary. 2dly, Conformity of ideas in reſpect to manner; for if the ideas of the hearer are not conformable to the manner repreſented, he will either remain indifferent, or, if they are contrary, inſtead of being delighted, he will be offended. I am certain, if an object of the moſt tragical nature was repreſented before a cannibal, he would not be ſhocked, but would enjoy it. 3dly, A conformity of movement to the metre: For there are people, and whole nations, whoſe movements are by nature ſlow; others, whoſe movements are quick; others temperate, or moderate. That movement, which is not able to ſtir one man, will be more than ſufficient to ſtir another; this is the caſe in general, in relation to nature and education. In particular, as to nature and education, whoever is ſufficiently acquainted with the nations of Europe only, muſt have obſerved the difference of movement amongſt different countries, during the intenſe influence of each reſpective paſſion.”

§ 129.
The ſame continued.

“ Theſe differences are, each by itſelf, generical, and generical in the higheſt degree; out of all which, a ſpecies being formed,

" one might perhaps be able to compoſe a proper example; I " ſay perhaps, becauſe, in reſpect to the union of all the above-" mentioned conditions, which compoſed the genus of the an-" tient Greeks, though we ſhould be able to diſcover and execute " it, juſt as it was amongſt that people, I much doubt whether " it would produce with us the ſame effect." One may gueſs, from theſe doctrines of our author, why he never compoſed any vocal muſic, which I always wondered at, till I read his treatiſes; for that touching ſweetneſs and delicacy of ſtile, that variety with ſimplicity, which reign in a ſovereign degree in all his pieces, ſeemed to qualify him, above all men, for moving the paſſions, particularly of the ſprightly and gentle kind; and his maſterly notes would have received infinite advantage by being joined to proper words.

§ 130. *The ſame continued.*

" I think I have delivered nothing but what is exactly true, " if ſo my doubt is reaſonable; nay, if I ſhould advance the " following propoſition, That it is impoſſible that the manners, " the poetry, and the muſic, that were homogeneous and proper " to the Greeks, ſhould be equally ſo to us Italians, and other " nations of our times and manners; this propoſition would not " be raſh. The ſeeds of the paſſions are, in general, the ſame " in all men; their ſpecific difference ariſes from education and " cuſtom. In our caſe, we want not the genus, but the differ-" ence: For this reaſon therefore, in the univerſal ſource of na-" ture, our buſineſs muſt be much rather to ſearch out for homoge-" niety and propriety, relative to our preſent circumſtances, than " to endeavour to diſcover, what, if really diſcovered, would be " very likely not to ſucceed. So much in relation to the uni-" verſal genus of all thoſe things, which are neceſſary to attain " ſuch a purpoſe as was mentioned above. I have meddled more in this affair than I ought, conſidering that the part I have undertaken is that of a muſician, not of a philoſopher or a poet.

§ 131.
Difference of muſical intervals.

“ But you, my noble friend, are waiting for me, on returning to my own profeſſion, in order to aſk my opinion in the concrete, and in preciſion, about the difference of the nature of our muſical intervals; which I aſſerted above to be different in their nature. This is an inquiry belonging to the muſician; and perhaps you may inquire farther, What my opinion is of the particular nature of the breakings or diviſions of our muſical notes, in relation identically to the value of feet in proſody; a conſideration common, not only to the muſician and the poet, but to the philoſopher alſo.

§ 132.
Difficulty of aſcertaining their effect.

“ The firſt inquiry, though indeed it comes within my particular ſphere, is to me much more difficult than the ſecond, which is of a common nature. The reaſon is obvious: The habits contracted by a profeſſor accuſtomed to a kind of muſic, begun and continued without particular reflexions, naturaliſe to ſuch a degree its parts, that, when there is no ſpecific difference between them, it is almoſt impoſſible to diſtinguiſh them by ſentiment; much more ſo, if the diſtinction falls upon individuals of the ſame ſpecies, or parts of the ſame category, as the conſonant intervals of the hexachord, and the intervals of the common diatonic ſcale. Add to this, that, as ſentiment in all men is not perfectly the ſame, and uniform, no concluſion can be drawn from it; on the contrary, being individual and particular, it does not produce that certainty which is neceſſary to conſtitute ſcience. We muſt therefore ſearch ſpecifically in what particulars the ſentiment of all mankind is common and uniform; and generically endeavour to find out

“ a prina principle of univerſal reaſon, which, to the diſgrace of particular prejudices contracted, may correct our ſentiment, if need be; and, to the diſgrace of cuſtom, render it aſſured and enlightened. This is no ſmall matter to bring about, nor is it indifferent. But to the trial.

§ 133. *Of the different nature of the 3d major and minor.*

“ In order to act, as I ought, conſiſtently with my principles, the examination of ſentiment and reaſon ought to fall upon the harmony, and not the ſong; becauſe the harmony is the cauſe and foundation, the ſong is the effect and offspring. According to the common ſentiment of all thoſe nations where our muſic is cultivated, the harmony of the 3d major is ſtrong, lively, bold; the harmony of the 3d minor is languid, melancholy, and ſoft. Upon bringing this common ſentiment to the teſt of reaſon, no other cauſe of a phyſical and demonſtrative kind can be aſſigned, but the harmonic nature of the 3d major, and the arithmetical nature of the 3d minor; the firſt being continuous, and therefore ſtronger; the laſt, contiguous only, and therefore more languid. From the force of the 3d major ariſes the lively and bold effect; from the weakneſs of the 3d minor, the melancholy and gentle effect.

§ 134. *Aſcending and deſcending intervals.*

“ Reflecting on this principle, derived from reaſon, I find, that a paſſage of the 4th aſcending ought to have more force than the ſame paſſage deſcending, on account of the harmonic cadence formed by the aſcending paſſage; of the arithmetical cadence formed by the deſcending. In vertu of this reaſon, I obſerve what happens to myſelf, and make others obſerve how it happens to them; and find that my own ſentiment, and that of others, correſpond to the reaſon aſſigned; and it is agreed that thus it happens in nature. The ſame reaſon, therefore, will hold good for the deſcending and aſcending 5ths: De-

" ſcending, they will be more forceable, chearful, and bold; " aſcending, more feeble, melancholy, and ſoft; becauſe, in " deſcending, they form an harmonic cadence, in aſcending, an " arithmetical one: Therefore, in a progreſſion of aſcending " 4ths, in the fundamental baſe, the harmony will be ſtrong " and lively, of deſcending 4ths the contrary, &c.

§ 135. *Same ſubject continued.*

" As the progreſſion of the above-mentioned paſſage ſets the " effect in a ſtronger light; ſo let any number of profeſſors give " their judgment, and I will venture to affirm, that it will be " conformable to reaſon. The ſame may be ſaid of a progreſ- " ſion of 5ths. But progreſſion makes a ſong, and the part " follows the nature of the whole: Therefore, ſongs formed from " the progreſſion of paſſages above-mentioned, will be reſpec- " tively of the ſame nature: Therefore, by means of this prin- " ciple, one may diſcover the nature of every interval in the " diatonic ſcale; becauſe, if from the progreſſion of the har- " mony the ſong ariſes, and this cannot but be of the ſame na- " ture with the harmony from whence it ariſes; then the hemi- " tone major, and the tone minor, both demonſtratively aſcend- " ing, being given upon the harmonic cadence, the effect of " them, as aſcending, will be ſtrong, cheerful, bold. Change " now the harmonic cadence into the arithmetical, in which caſe " the aforeſaid ſame intervals, and ſame notes, will demonſtra- " tively deſcend; and the effect of them, as deſcending, will " be languid, melancholy, and ſoft. But of the vivacity and " force of the hemitone major aſcending, and of the ſoftneſs of " the ſame note deſcending, we are convinced, to the reproach " of cuſtom; and the tone minor, that is over the hemitone, is " phyſically demonſtrative of the ſame harmony: Therefore, " that ſuch is the nature of theſe two intervals, appears both " by reaſon and ſentiment."

If

§ 136. *Explication of the foregoing article.*

If I underſtand my author, he means this: Suppoſe the chord E *g* is followed by the chord F *a*; then it is clear, that the baſe is *c* F, as he has put it in the example, and the 5th deſcends, which, according to the foregoing doctrine, is of a ſtrong and lively nature. Suppoſe, on the other hand, the chord F *a* to precede the chord E *c*; then the baſe will be F *c*, i. e. an aſcending 5th, which, he ſays, is of a melancholy and languid nature. Now that the baſe is F *c*, is clear from the phænomenon of the 3d ſounds, to ſay nothing more; for F *a*, being a 3d major, has for 3d ſound the octave of F, or the loweſt note in the chord; and E *c*, being a 3d minor, has for baſe the tenth lower than the loweſt note in the chord, i. e. C.

§ 137. *This doctrine about intervals new.*

This whole doctrine about the effect of intervals, as far as I know, is entirely new, and of great conſequence; but I muſt frankly confeſs, that in ſome reſpects I do not perfectly agree with Tartini. He lays the whole ſtreſs upon the harmonic and arithmetical cadences: I think, the effect often depends on paſſing from the extreme to the mean, or the contrary, which difference will, I believe, anſwer in many caſes; but then we muſt take in another conſideration, which I wonder he ſhould omit, as he has been ſo accurate and explicit about the effect of bars. Now I am apt to imagine, that the melancholy effect, or the contrary, does not depend barely upon the harmonic or arithmetical cadence, or on going from the extreme to the mean, or the contrary; but alſo upon the place where the extreme or mean falls in the bar. Thus, let us take theſe notes, C, G, E, C, and let the bar begin with the firſt C, I have no doubt but that they will have a lively effect. Take now the ſame notes in the ſame order, and let the bar begin upon G, and I imagine their effect will be totally changed. But I go farther, and maintain, that though the 3d minor is of a melancholy nature in general, yet let the ictus fall upon the extreme, and the ſoft and melancholy effect will diſappear. Again, take the ſame notes, and let the ictus fall upon the mean, and a quite contrary effect will be produced; the air will be ſoft and languid. For it muſt be obſerved, that the 3d minor is full as well adapted to expreſs rage and violence, ariſing from grief, deſpair, &c. as melancholy of the gentle kind; and that the 3d major is not only adapted to expreſs cheerfulneſs, anger, and indignation, but alſo ſerenity, and compoſed tenderneſs. I could give inſtances, to confirm the doctrine above delivered, out of opera ſongs; but I chooſe rather to leave the whole to be conſidered by muſicians of taſte and feeling, who cannot be at a loſs to find examples of all the kinds. Let us return to Tartini.

§ 138.

Effect of the octave.

" Here then we have got a key to lay open the nature of in-" tervals by the force of reaſon; this key is the harmony; and " therefore the hardeſt interval to account for is the principal " interval of all; I mean the octave; becauſe it cannot be refer-" red to the harmony. We muſt therefore examine it in another " light. Since this is the chief of all the intervals, its character " muſt be ſimple, grave, and majeſtic. Its character of ſim-" plicity is manifeſt by the converſion of the acute term into the " grave, becauſe it becomes uniſonous. Its gravity and ma-" jeſty appear to me as manifeſt, inaſmuch as it cannot, by its " nature, be proper for any part but the baſe; and therefore it " is an interval ſtrong and ſevere, though joined to the utmoſt " ſimplicity. In fact, a ſong filled with many progreſſive in-" tervals of the octave, either aſcending or deſcending, and exe-" cuted along with correſponding notes by a baſe and a ſoprano, " (extremes ſet off one another beſt); when it is well executed " by a baſe, will impoſe and produce the aforeſaid excellent ef-" fect;

" effect; if well executed by a ſoprano, it will not only not pro-
" duce the ſame effect, but it will be diſguſtful and ſhocking."

§ 139.
Intervals in relation to the voice.

" Here begins to open another principle of reaſon and ſentiment, which is the agreement of intervals with the voice. Rigorouſly ſpeaking, the principle is the ſame, *viz.* harmony; but as in harmony, diſpoſed ſtrictly according to rule, every interval has its particular place in the reſpective voices, that integrate or conſtitute harmony; ſo in proportion as in the progreſſion of the harmony, the ſong is formed by the voices, the intervals which reſult neceſſarily, and not arbitrarily, ariſe reſpectively individuated to every voice; and this is the particular principle of their agreement. In relation therefore to theſe two principles, the conſideration is twofold, in every interval of the diatonic ſcale, i. e. both as to the nature of the effect, and as to the agreement of the place. The conſequences and deductions from hence are ſuch and ſo many, that they are equivalent to an entire and ample treatiſe. But this is not a place to treat upon them; and you, my noble friend, know very well how to do it yourſelf.

§ 140.
Breaking of notes.

" I proceed therefore to give you my opinion on the nature of breaking muſical notes, with reference to the value of feet in proſody; I mean really the nature of the feet, and not the nature of the muſical notes; becauſe, in this reſpect, muſic is ſubſervient to poetry. This affair belongs properly to the poet, much more in the character of a philoſopher than a muſician. The thing is clear, becauſe the buſineſs of a philoſopher is to ſearch out what kind of movement is adapted to each paſſion, and therefore he ought to know immediately the correſpondence of the internal and external ſenſes; which will enable him to open his way to the internal ſenſes, by means of external movements properly adapted. The muſician has nothing to do but to preſerve the above-mentioned movements with exactneſs and rigor; I therefore ſaid before, that the firſt inquiry about the nature of muſical intervals was to me much more difficult than the ſecond, about the way of breaking the intervals. In the firſt inquiry, it was my duty to intereſt myſelf, and thoroughly enter into it as a muſician; in the ſecond, I am not concerned, as being neither poet nor philoſopher. Produce me then a poet, who is alſo a philoſopher, and will perform his part, and in this caſe I think certainly, that I, even I, ſhould be able to perform mine. This is my opinion about the ſecond inquiry.

§ 141.

Muſic and dancing go together.

“Were you however, who have ſo much power over me, to inſiſt upon my making trial of myſelf as poet and philoſopher, upon this ſubject; I will tell you, with my uſual ſincerity, that by word of mouth I ſhall have no difficulty to declare my ſentiments to you in private, as freely as you can deſire or command; in writing, certainly not. I know my limits, and obſerve them rigorouſly. Nothing is more eaſy than the communication of what is written, either by reading or by a copy; and I bluſh already at the thoughts of appearing as a muſician, poet, and philoſopher. I have undertaken more than enough, as a muſician only; inſomuch that I am rather confounded, than ſatisfied, with what I have already done. Let this be my utmoſt boundary; or, if I preſume to go one ſtep farther on this ſubject, let it be to make a particular malicious obſervation. It is this: Wherever there is muſic (and muſic there is, of ſome ſort or other, in every nation) it is never found without dancing. This is a key to diſcover and deduce movements, and muſical breaks, relative to the diverſity of people; nor is there any danger of being led into an error by attending to it,

" as it is the very language of nature. From hence ariſes that " conſtancy, for ages, in the uſe of the ſame kind of dance, " adopted by each nation reſpectively, to ſuch a degree, that at " laſt dances get their name from the nation where they are practiſed. In each of theſe dances, we ſhall infallibly find the " phyſical movements correſponding with the long and ſhort " ſyllables, and metrical feet; it is ſufficient to obſerve and " make uſe of them, which is no difficult matter. You have " my philoſophy on this point, which I call by a more proper " name, a malicious obſervation. Do you, illuſtrious Sir, judge " whether, in the preſent caſe, it is better to be a philoſopher " or an obſerver. Here I put an end to the 5th chapter, much " better pleaſed with myſelf for having obeyed you, than for " having written what I have."

§ 142. *3d minor.*

Before I enter upon an examination of Tartini's next chapter, I ſhall give the ſyſtem of the 3d minor, which I promiſed § 44, and which I choſe to place here, as the knowledge of it is particularly neceſſary for underſtanding the remaining part of his book: But as I have not hitherto fully explained the foundation of the ſyſtem of the 3d major, or, at leaſt, have not put it in a point of light, which will ſerve to explain the ſyſtem of the 3d minor, I ſhall begin firſt with that.

§ 143. *3d major.*

It was obſerved, § 53, that Tartini, in order to fill up the octave, made uſe of the muſical intervals C, F, G, C, expreſſed by the numbers 6, 8, 9, 12, which Pythagoras is ſuppoſed to have firſt diſcovered, vide § 12. Why thoſe notes only can be uſed as baſes, ſhall now be made evident. No notes then can be prime baſes, but ſuch as have perfect 3ds major and perfect 5ths belonging to them; for this is the preciſe and ſpecific idea furniſhed by the ſtring of three ſounds, § 2. With theſe the ear is ſatisfied, and with none elſe; and what Ariſtoxenus ſays, p. 33, is certainly true, though miſapplied by him, that the ſenſation of a muſical ear may be almoſt looked upon as a firſt principle in muſic. Let us now examine the notes of the octave by the rule above-mentioned.

C has for	3d, E perfect.
	5th, G perfect.
D - -	3d, F imperfect.
E - -	3d, G imperfect.
F - -	3d, A perfect.
	5th, C perfect.
G - -	3d, B perfect.
	5th, D perfect.
A - -	3d, C imperfect.
B - -	3d, D imperfect.

From hence it appears, that there can be but three prime baſes, *viz.* C, F, and G, in the diatonic octave.

§ 144. *3d major.* From the foregoing obſervation it appears alſo, that all other notes beſides C, F, and G, when uſed as baſes, muſt have ſome figure or figures belonging to them; which figure or figures, when put over them, ſhew that ſuch baſes are not prime or fundamental; and at the ſame time give the true baſe; ſo that all of them together make 3d and 5th. Thus to go through the notes of the octave, C, F, and G, have no figure over them; becauſe 3d and 5th are played with them of courſe. D ought to have $^{6}_{4}$ over it, which ſhew that it is not prime baſe. Now, the 4th to D is G, and the 6th to D is B; ſo that, as it appeared before, that B cannot be a prime baſe, G muſt be ſo in this caſe. Now, B, D, make 3d and 5th to G. Next, E ought to have 6 over it; therefore C, which is 6th to E, is prime baſe; and theſe two notes, along with the 3d to E, which is always ſuppoſed when the 4th is not marked, give the 3d and 5th to C. G ought to have $\genfrac{}{}{0pt}{}{6}{4}$ over it for the ſame reaſon that D has: For though it is ſometimes a prime baſe, yet as in regularly aſcending through the notes of the octave, it goes immediately before a cloſe in F, it muſt be conſidered here as 5th of C. Next, A ought to have 6 over it, for the ſame reaſon that E has. Laſtly, B ought to have 6 over it, for the ſame reaſon; ſo that the notes of the octave, uſed as baſes, ſtand thus, along with the correſpondent prime baſes:

	$\genfrac{}{}{0pt}{}{6}{4}$	6		$\genfrac{}{}{0pt}{}{6}{4}$	6	6	
C	D	E	F	G	A	B	C.
C	G	C	F	C	F	G	C.

§ 145. *3d minor.*

Let us now proceed to the inveſtigation of the ſyſtem of the 3d minor, which I ſhall do in a way different from what Tartini takes, but ſtill making uſe of his clue. He obſerves, that there is a note ariſing in the hexachord, which he marks E♭, fig. 1. ex. 3. This note is a 3d minor to C, the fundamental and univerſal baſe to all the notes in the hexachord. Here then is a beginning given to a ſyſtem very different from that of the common diatonic ſcale. I have ſhewn § 40, that this note is a conſonance, as every note in the hexachord, whether it be arithmetical or harmonic, muſt be; as they all ariſe from aliquot parts of 60; and I have beſides given, § 41, ſome reaſon to think that all theſe notes do, potentially at leaſt, if not actually, exiſt as ſounds, upon ſtriking a muſical ſtring; nay, that they do ſometimes exiſt actually, I ſhall endeavour to prove afterwards. But, however this may be, we certainly have got a beginning for the ſyſtem of the 3d minor, in the moſt natural, and, I may ſay, the only natural, way: For whatever ſyſtem, as Tartini obſerves, does not ariſe from the harmonic, muſt be arbitrary. To which I will add, that to ſuppoſe any thing to be arbitrary, which is univerſally pleaſing, is to ſuppoſe that our ſenſes were framed without any ſpecific adaption to the objects that affect them; and that in ſome particulars only, when in others of the ſame kind we can trace the utmoſt regularity; which is a ſuppoſition too wild to be admitted.

§ 146.

Inveſtigation of the 3d minor.

But to quit theory, and come to experiment. Let any muſician, after having fully ſettled the tone of C with a 3d major, deſcend from C through G, F, E, to E♭, and he will find, that he is brought out of the ſyſtem of the 3d major into that of the 3d minor imperceptibly and agreeably; and that he may, if he pleaſes, by playing D after E♭, make a cloſe in C. In this caſe, he is got full into the ſyſtem of the 3d minor; but how to continue in it is the difficulty. This difficulty, great as it is, I will now endeavour to ſolve, expecting the indulgence of the reader, if I fail, in a point which has never, as far as I know, been cleared up ſatisfactorily; not even by Tartini himſelf; though he has eſtabliſhed the true ſcale, and the right uſe of it, by a very inſtructive example, and alſo furniſhed every principle I make uſe of in this intricate affair. In order to underſtand it, I deſire the reader to recollect what was ſaid, § 143, about the neceſſity of having 3ds major and 5ths to every prime baſe; but we muſt except the 3d to C, in this caſe, from the very nature of the thing. We have got therefore C, E♭, G; but, in order to make a full cloſe upon C, its 5th, or G, muſt have 3d major and 5th; i. e. B and D. We have therefore got B, C, D, E♭, G. Again, the 3d ſound to C, E♭, is A♭; vide fig. 3: Therefore only one note, viz. between E♭ and G, is wanting to compleat the octave. Let us ſuppoſe it to be F, then the 3d ſound to F, A♭, will be D♭; but D was ſettled, as well as A♭: Therefore, ſince A♭, which, along with F, produced D♭, (which cannot belong to the ſcale) cannot be altered, F neceſſarily muſt. Let us make F* 3d major to D, and the 3d ſound to F*, A^{b}, is B, which belongs to the ſcale. I might as well have determined F* by the 3d ſounds to D, F and D, F*. In the former caſe, it is B^{b}, which cannot belong to the ſcale; in the latter, it is D, which does belong to it. I muſt obſerve, upon this occaſion, that though the 3d ſounds, belonging to the ſyſtem of the 3d minor, if heard, would be extremely diſagreeable, as being double, and their progreſſion aukward, yet they always belong to the key; as will be evident at once, to any one who examines them. We have now got all the notes belonging to the ſyſtem of the 3d minor; becauſe, by changing any note, we change the relation it bears to every other note, and conſequently change the ſyſtem: Therefore F and B^{b} are excluded.

§ 147. *Baſes in the 3d minor.*

Let us next examine, which notes of this ſcale can be prime baſes. D cannot, becauſe D, A^{b} makes an imperfect 5th; E cannot, becauſe B makes a ſuperfluous 5th with it; F* cannot, becauſe it makes a defective 5th with C; G may be prime, becauſe it has a perfect 3d and 5th; A^{b} may be alſo prime, for the ſame reaſon; B cannot, becauſe it makes a 3d minor with D; C is prime of courſe: So that all the prime baſes are C, A^{b}, G. I have by means of this theory, which is chiefly borrowed from Tartini, and by the help of his muſical example in the 3d minor, given a ſcale with the baſe, vide fig. 9. It appears by that ſcale, that the paſſage from B to A^{b}, G, F*, and from A^{b} to G, F*, E^{b}, are perfectly regular.

§ 148. *Objection.*

It will be ſaid, by way of objection to the ſcale above-mentioned, that no piece of muſic is to be found, where the notes, therein ſpecified as belonging to the ſyſtem of the 3d minor, are alone employed. I readily own that it will be difficult to find ſuch a piece: but yet paſſages of that kind are to be met with here and there in the beſt Italian compoſers, though the practice is not ſteady and uniform. This is not extraordinary when there is a want of principles to direct: Nor would it be extraordinary if no ſuch paſſage was to be met with at all: ſince, as Ptolemy rightly obſerves, Harm. page 2: 'the ſenſes diſcover what is nearly 'true, and receive from reaſon what is accurately ſo; whereas 'reaſon receives from the ſenſes what is nearly true, and diſ'covers what is accurately ſo.' And afterwards, page 3: 'A 'man might think a circle made by the eye only to be very accu'rate, till he has ſeen one made by a pair of compaſſes; ſo it is 'with the ear in muſic.' For this reaſon too much pains and ſtudy can never be employed in order to diſcover principles in every branch of knowledge; I mean when the pains and ſtudy are proportioned to the dignity of the ſubject.

§ 149.
Deviations in practice.

But the deviation from the ſcale above-mentioned, is not always owing to want of principles; on the contrary it is frequently owing to a change of key, which, though not attended to, is real. The tone of the 3d above, and that of the 3d below, i. e. of E♭ and A♭, are ſo cloſely connected with it, that we are perpetually led by nature to touch upon one or other of them; and whenever that happens, the 4th or 7th muſt be altered reſpectively. But that happens whenever the 3d or 6th of the principal is in the beginning or middle of the bar: i. e. when they are accented. I will not affirm, that no change ought to be made in any other caſe; but I do not at preſent recollect one, where there ought to be any; and leave that point, as well as many others, to be decided by proper judges. I will ſay thus much, however, from my own feeling, that by ſubſtituting B and F♯, in the room of B♭ and F, in many places, in ſongs and other pieces, the effect was greatly improved.

I ſhall

§ 150.
Obſervation on the 3d minor.

I ſhall make a few obſervations on the aforeſaid ſcale. 1ſt then, there are no two whole tones, following one another, throughout the octave. This was one of the characteriſtics of the antient chromatic, vide § 83. 2dly, There are two tetrachords; viz. from F✱ to B, and from E♭ to A♭; conſiſting each of two dieſes; which, both together, are leſs than the uncompounded triemitone. This is another characteriſtic of the antient chromatic; Ariſtid. p. 18; Euclid, p. 10. 3dly, The nature of the 3d minor is ſoft and melancholy, which is another characteriſtic of the antient chromatic. Many teſtimonies might be produced in proof of this aſſertion; but I ſhall content myſelf with two only at preſent: Ariſtides, p. 111, ſays, the chromatic is very pleaſing and plaintive; and Plutarch, Vol. II. p. 109, puts this query, Why does the chromatic ſoften the mind? But I do not conclude, from theſe reſemblances, that they are the ſame; on the contrary, I am certain they are not, both from what Tartini has ſaid, and from other reaſons. 4thly, This ſyſtem, when practiſed in all its purity, is adapted to expreſs not only ſoftneſs and melancholy, as I obſerved above, but peculiarly alſo the conflict of jarring paſſions of the plaintive kind; as love mixed with deſpair, jealouſy, &c. The perpetual contraſt of great and ſmall intervals, contributes, I imagine, very much to produce this effect.

§ 151.
Tuning the Harp for the 3d minor.

I ſhall now give what I promiſed § 60, viz. the method of tuning the Harp for the 3d minor; which is as follows: From C to G, and from G to D, perfect 5ths; from G to B, upwards, a perfect 3d major; from B to F✱, upwards, a perfect 5th; from G to E♭, downwards, a perfect 3d major; from E♭ to A♭, downwards, a perfect 5th: For accidental notes, from C to F, downwards, a perfect 5th; from E♭ to B♭, upwards, a perfect

5th. Theſe are the principal accidents; the reſt muſt be managed as ſhall be found moſt expedient upon trial. I muſt obſerve, upon this occaſion, how neceſſary it is for harpers to be particularly careful about tuning their inſtrument accurately; as the poſſibility of doing it is the chief circumſtance that gives it a ſuperiority over ſome other inſtruments; and a great advantage that is.

§ 152. Pinedo *on the Harp.*

I quoted before, § 62, many paſſages from Engliſh writers, that ſeemed to put the Harp on a very reſpectable footing. I ſhall now quote an expreſs proof in its favor from a foreigner, and one who I ſhould imagine was no bad judge of ſuch matters, both as a theoriſt and a practitioner. His name is Thom. de Pinedo. Of his ſkill in the theory of muſic, he has left us a very ſufficient ſpecimen, in his notes upon Stephanus de Urbibus; where he has inſerted a ſhort diſſertation on muſic, which is very well put together; in which are theſe words: 'I was incited to 'give an account of muſical intervals, by the learned diſſertation 'of Joan. Albert. Bannus; in which he deſires ſome one will 'give a new conſtitution of muſic, by placing hemitones between 'all the tones, ſo that the art of muſic may be rendered com'pleat, and fit to move the paſſions. I will gratify his deſire, 'which I am enabled to do by my ſkill on the Harp with two 'rows of ſtrings, the QUEEN of all muſical inſtruments; in which, 'on account of the number of its ſtrings, viz. 39, may be ſeen, 'as in a glaſs, all the muſical intervals; and by whoſe ſweet 'harmony, ariſing from the diſcordant agreement of ſtrings, 'ſtruck with the fingers inſtead of a plectrum, I have long not 'only amuſed myſelf, but have alſo relieved the miſery attend'ing an undeſerved baniſhment from my native country.' Artic. Timoth.

I promiſed likewiſe, § 65, to ſay ſomething more of Æolus's Harp, that extraordinary inſtrument invented by Father Kircher, as extraordinary a man, who was made up of whim and genius. The wonderful effect of this inſtrument has been felt by all who have heard it, and have an ear for muſic. It has produced two elegant poems in our language, and afforded an opportunity for imagination to diſplay itſelf in terms though ſtrong, yet not exaggerated. I ſhall quote one of them at length; and I pitch upon it, in preference to the other, becauſe it gives a compleat idea of the great variety of muſic produced by a few ſimple uniſon ſtrings, and becauſe it tends very much to illuſtrate and confirm my theory; vide § 39, &c.

§ 153. Æolus's *Harp.*

ODE ON ÆOLUS's HARP:

Dodsley's Miſcell. Vol. III. p. 211.

1.

Æthereal race, inhabitants of air!
  Who hymn your God amid the ſecret grove;
Ye unſeen beings, to my Harp repair,
  And raiſe majeſtic ſtrains, or melt in love.

2.

Thoſe tender notes, how unkindly they upbraid,
  With what ſoft throe they thrill the lover's heart!
Sure from the hand of ſome unhappy maid,
  Who dy'd of love, thoſe ſweet complainings part.

3.

But hark! that ſtrain was of a graver tone;
  On the deep ſtrings his hand ſome hermit throws;
Or he, the *ſacred bard!* who ſat alone
  In the drear waſte, and wept his people's woes.

4.

Such was the ſong which Zion's children ſung,
When by Euphrates' ſtream they made their plaint;
And to ſuch ſadly ſolemn notes are ſtrung
Angelic Harps, to ſooth a dying ſaint.

5.

Methinks I hear the full celeſtial choir
Through heav'n's high dome their awful anthems raiſe;
Now chanting clear, and now they all conſpire
To ſwell the lofty hymn from praiſe to praiſe.

6.

Let me, ye wand'ring ſpirits of the wind,
Who, as wild fancy prompts you, touch the ſtring,
Smit with your theme, be in your chorus join'd;
For till you ceaſe, my muſe forgets to ſing.

§ 154. *Its effect not accounted for.*

In the foregoing Ode, effects are deſcribed, and I think very truly, which cannot be accounted for by the common ſyſtem: For the harmonic notes are only 3d, 5th, and 8th to the principal; which ſeem to make but one ſound, as appears by adding 12th and 17th to the pipes of an organ; vide § 6. It is true, other intervals are produced, as 6th major and minor, 4th and 3d minor. But theſe will not account for the phænomena; whereas, if we add the arithmetical notes, the number and nature of the intervals is greatly altered. The number is 19; among which are 7ths, 6ths major and minor, 5ths, 4ths, 3ds major and minor, a tone major and a minor, a hemitone major and a minor. But it will be aſked, How ſhould theſe notes be heard in Æolus's Harp, when they never have been heard on a ſingle ſtring? I anſwer, That the lower or arithmetical notes may want to be excited to vibrate diſtinctly, by a greater power of harmonic notes than what a ſingle ſtring furniſhes. There is an obſervation, in Lord Keeper North's tract on muſic, which illuſtrates and confirms my reaſoning. He ſays, p. 20, ‘ An organ-pipe of a ‘ very deep baſe will not ſpeak ſuddenly, when it is alone ; but ‘ if an octave be in play at the ſame time, it will anſwer the quick- ‘ eſt touch.’ I will alſo obſerve, that the double baſe, when played upon alone, gives the moſt languid tones imaginable ; whereas, when accompanied, its tones are firm and vigorous.

§ 155. *An illuſtration on the ſame ſubject.*

But I can go one ſtep farther ſtill, and prove, that the arithmetical notes not only may be ſounded as I have ſuppoſed, and in part rendered probable, but that they actually have been ſounded. It is notorious, that the German horn has the ſame notes as the trumpet marine, and no other. Now, I remember to have heard Charles, the famous performer on the German horn, ſound ſome low notes, which ſurpriſed me, and made me ſuſpect that all the theory about that inſtrument was falſe. This idea remained with me for many years, and I never could hit upon any ſolution, till the foregoing theory occurred to me, which ſeemed to take away all the difficulty. Charles was reckoned an admirable performer, and when he blew the low notes abovementioned, he uſed no artifice whatever, but what aroſe from his conſtant experience and genius. I aſked him, at the time, what the notes were which he ſounded ; he told me, but I have now totally forgotten them : theſe particulars however I remember, which are very much to the purpoſe, viz. that they were four deſcending notes, and two of them, as he told me, and as I heard, were what we vulgarly call hemitones ; from whence I conclude, that the notes muſt be G, F, E, E♭ ; for there are no other low notes but theſe, that can poſſibly be ſounded. If other performers would learn to ſound them, the uſe and effect of the horn might be much extended. The cloſe

CHAP. V. and intimate connection between the arithmetical and harmonic ſyſtems appears from this, that if you take away F, you deſtroy all our muſic at once, but that on the German horn, trumpet marine, and common trumpet; all which inſtruments have preciſely the ſame notes. From the whole, I conclude, that no one has hitherto

> **Untwiſted all the chains that tie**
> **The hidden ſoul of harmony.**

But I return to Tartini, who begins his 6th and laſt chapter thus:

CHAP. VI.

§ 156.

Modern intervals and modulations.

"I am now gotten into a ſafe harbor, being returned to the "preſent ſyſtem, relying upon which, I proceed to the examina-"tion of thoſe particular intervals and modulations, which are "commonly uſed in modern muſic, but were not known in the "15th century. If there was any particular compoſer who uſed, "in thoſe times, ſuch intervals, of which I am going to treat; "or whether the uſe of them began afterwards, I neither know, "or is it of importance that I ſhould know; it being a ſufficient "reaſon for me, that they are uſed at preſent, to examine their "foundation and nature." He then ſhews the modern method of managing the ſuperfluous 2d, the diminiſhed 3d, the diminiſhed 4th, the diminiſhed 7th, the ſuperfluous 6th, and the ſuperfluous 5th. But beſides the intervals, which he has particularly conſidered, other methods are practically deduced from them; but theſe, he ſays, are ſufficient to give an idea of them. Then adds, "All theſe intervals are included in the pre-"ſent univerſal ſyſtem; they are the very intervals in the mu-"ſical example 4, fig. 1, with which the common diatonic ſcale is "inſpiſſated, and are chromatic and enharmonic relatively to the "preſent ſyſtem." By theſe laſt words he means, that they are not ſo relatively to the antient ſyſtem, of which he profeſſed before ſore that he knew nothing. He then ſhews how theſe modern intervals are conformable to his own ſyſtem; and adds, what is of great conſequence, as follows:

§ 157.

Firſt baſes in the 3d minor.

"I grant, that ſuch a kind of muſic may be practiſed according to the foregoing ſcale; viz. D, E, F, G*, A, B^{b}, C*, D; and with the utmoſt rigor, according to the foregoing intervals, both in the harmony of the fundamental baſe, and alſo in the reſpective notes of the upper parts. The only rules neceſſary to be obſerved ariſe of themſelves, from the nature of the ſcale. The firſt rule is, that none but the notes capable of that harmony, from whence the diatonic ſcale is deduced, either can or ought to be firſt baſes; ſince it is undoubtedly true, that every other genus is deduced from the diatonic, as its origin and firſt principle. But this propoſition is true to a demonſtration; becauſe, if the chromatic and enharmonic genera ariſe from the ſmalleſt diviſion of the hemitone major, you muſt firſt ſuppoſe the hemitone exiſting entire. But the hemitone is diatonic; therefore the two genera above-mentioned cannot exiſt, unleſs as founded and eſtabliſhed on the diatonic genus; therefore much more is the harmony founded upon it. In fact, in the notes D, F, G*, B^{b}, of example 4, fig. 1, the thing is evident. The firſt interval D, F, is a third minor, therefore diatonic, becauſe deduced from the common ſcale D, E, F: Therefore, in the fundamental baſe, there can be no other firſt baſes but D, B^{b}, A; becauſe, in the above-mentioned ſcale, there are no other but thoſe aſſigned."

Firſt rule.

§ 158.

Obſcurity of the laſt article.

I muſt fairly own, that I do not comprehend the latter part of Tartini's reaſoning in the foregoing article. I ſuppoſe it muſt be my own fault; for the firſt baſes which he aſſigns in the ſyſtem of the 3d minor, are preciſely the ſame which I deduced § 147, in a manner, I imagine, ſimilar to what he hints, when he ſays, in the preceding article, *that none but notes capable of that harmony*, (i. e. that kind of harmony) *from whence the diatonic ſcale is deduced, can be firſt baſes.* For the diatonic ſcale was deduced from the 3ds and 5ths to the prime baſes; vide § 53: Therefore e converſo, where a 3d and 5th cannot be had to any note, that note cannot be a firſt baſe. So much as to his firſt rule, in relation to what he calls chromatic: In relation to his enharmonic, I need ſay nothing, having ſhewed before, article 84, that it is moſt probably built on a miſtake. I proceed now to his ſecond rule.

§ 159. *Firſt baſes in the 3d minor.* *Second rule.* "There is," ſays Tartini, "no room left for any ſupplemental muſical accidents; becauſe the ſecond rule ought to "be the inalterability of the ſcale, both in the harmony and in "the ſinging part, otherwiſe nature itſelf would be changed; "and therefore, if you had a mind to make F firſt baſe, in the "key of D, taking away ✻ from C, it would be an error. Likewiſe, if you were to make C natural, G natural, &c. firſt baſes, "it would be an error, becauſe it would be an inverſion of nature. "In fine, as the common ſcale is unalterable, in relation to the "nature of the diatonic genus, ſo ought this new ſcale to be "unalterable, in relation to the particular genus of the preſent "ſyſtem; and the more ſo, becauſe theſe two ſcales ought to "have certain properties in common. From the ſame univerſal "principle, the diatonic ſcale was demonſtratively deduced; and "the preſent ſcale is alſo deduced demonſtratively; therefore "both of them are unalterable." I have obſerved above, § 149, that if you change ſome of the notes belonging to the ſcale of the 3d minor, you go into the 3d major almoſt inſenſibly; which, I imagine, has occaſioned all the confuſion in theory relating to the ſyſtem of the 3d minor; and conſequently in the doctrine of practical writers. But to return to Tartini.

§ 160. *Practical example in the 3d minor.*

" From theſe two rules we may practically treat this kind of " muſic; (i. e. with a 3d minor) and with an excellent effect, as " far as my own feeling, and that of other unprejudiced people, " can determine. See here an example which coſt me but little " ſtudy and pains: The tone is transferred out of D, into A, " for the convenience of the inſtruments." This example conſiſts of a piece in four parts in the 3d minor, where there is not a note which does not belong to that ſyſtem, and is therefore, I ſuppoſe, not to be paralleled out of all the immenſe quantity of muſic which has been compoſed ſince the revival of arts in Europe. As to the chord which Tartini makes uſe of, viz. F, A, C, D*, which, he ſays, contains no diſcord, I cannot help being of another opinion. D* is no note of the hexachord, and therefore, if my theory is right, it muſt be a diſcord; but any note belonging to the ſcale may be uſed, if it can be reſolved properly as D* is here upon E. What he ſays afterwards, that if you put the harmony thus, D*, F, A, C, it will be harſh and awkward, is moſt likely to be true, becauſe the chord is entirely reverſed. As to what he obſerves alſo about the 7th of F, that it ought not to be expreſſed by the letter E♭, he is certainly in the right, if E♭ is taken for the 3d minor of C; becauſe there is not the ſame interval between E♭, F, in the key of B♭, with a 3d major, as between F, G, in the key of C 3d major, which there ought to be; for from E♭, 3d of C, to F, is a tone minor; whereas from F to G, is a tone major. Tartini thus goes on.

§ 161. *Obſervations on the muſical example.*

" I have four things to add in relation to the above-mentioned " muſical example; the firſt is, that I have deſignedly diſpoſed " the harmony of the four notes, F, A, C, D*, in different

“ manners, ſo that the effect, the uſe and management of “ ſuch intervals might appear. The 2d is, that this particular “ ſyſtem is capable of many diſſonances, without any alteration “ of the given ſcale, which is eaſy to obſerve. The 3d is, that “ though I have called this ſcale and this ſyſtem chromatic and “ enharmonic, I do not therefore pretend that it ought to “ be called ſo, rigorouſly ſpeaking; however, what I ſhewed in “ the diatonic inſpiſſated ſcale is certain, viz. that it is analogous to the chromatic and enharmonic.——But not to give “ myſelf any trouble about names, it is ſufficient for me, that “ the difference of the two ſcales is obvious, and alſo of the two “ harmonies; ſo that the diverſity of the ſyſtem eaſily appears. “ I am ſatisfied with having reduced to their genus, nature, and “ principle, thoſe intervals that we ſparſedly and indifferently “ uſe in practiſe, without rule, and without category. The 4th “ thing to be obſerved is, and a thing of importance, that the “ four notes, D, F, G*, B♭, which are the foundation of this “ particular ſyſtem, and which are preciſely the diſſonances ſet “ forth in example 4, fig. 1, in relation to the diatonic ſcale, “ in this ſyſtem are employed as conſonances. Obſerve therefore, “ on one ſide, the perfection of their principle, which is the “ circle; and, on the other ſide, the falſe idea that muſicians “ have hitherto had, that diſſonances are intervals diſagreeable “ to the ear. I am perfectly ſure, that many people will be uncommonly pleaſed with this particular harmony, although “ compoſed of muſical notes that are to all appearance diſſonant; “ I am almoſt certain, that no one will be diſguſted with “ them.”

§ 162. *Diſſonances.* I muſt obſerve, upon this occaſion, that what Tartini juſt now ſaid, that the above-mentioned diſſonances are treated as conſonances, is a confirmation of what I maintained above, § 48, that there are no diſſonances belonging to muſic, but what ariſe from altering the harmony in ſome parts, while in others it remains the ſame, &c. This idea is perfectly clear and preciſe, and, I believe, perfectly true. This far is, I think, at leaſt certain, that my author gives no inſtance to the contrary, though he has ſo fully treated this point. This is an idea I have long had, and am pleaſed to ſee I have no reaſon to alter it. We are now drawing towards a concluſion: But before my author finiſhes, he has ſomething to offer, that will fully ſhew the uſe, and indeed the neceſſity, of principles in muſic. It will ſhew that ingenuity will not ſecure a muſician from wandering out of his way, when he has not a proper guide to direct him. He will be like a pilot, who has neither ſun, moon, nor ſtars, to look up to. I muſt obſerve, that the inſtances hitherto given by Tartini, of modern intervals and harmonies, are what properly belong to the ſyſtem of the 3d minor, though by ſome looked upon as licenſes; but we are coming to ſomething of another nature; for he ſays,

§ 163.
Extravagant modulations.

"From the particular intervals mentioned above chiefly ariſe "particular modulations, which many at this time make uſe "of. I ſay *chiefly*, becauſe, as will be ſeen, there may be ſome "few modulations not dependant on them. I ſay alſo *many*, be"cauſe not every one, who yet knows very well what he is about, "chooſes to employ them; nay, I have obſerved, that thoſe "diſtinguiſhed artiſts, who have exquiſite ſentiment, joined to "great knowledge in their art, never uſe them at all. Theſe "particular modulations are, in reality, mere artificial deceits; "becauſe, where the modulation ought to paſs, by the nature of "the tone in which the compoſition is diſtinctly inſtituted, to "ſuch a determinate and relative tone, it is made by artifice to "paſs to a tone quite diſtant, both by nature and relation, from "the principal one firſt ſettled." He then gives two or three

examples,

examples, taken, I ſuppoſe, out of the works of compoſers, and explains whence the artifice, or rather deceit, ariſes; and obſerves upon one of thoſe examples, which certainly furniſhes a moſt ingenious way of going wrong, that it is looked upon as a ſingular beauty and delicacy in the art. It would be in vain to endeavour to give a diſtinct idea of all theſe artifices, without muſical notes; but it is not on this occaſion only that they are wanting; this treatiſe in many parts points to the original; for my deſign is not to ſuperſede that excellent work, but to recommend and illuſtrate it, as far as I am able. He goes on,

§ 164.

Source and uſe of ſuch modulations.

" I will not take upon me to produce more exquiſite inſtances " of ſuch modulation; thoſe I have given, which occurred as " I was writing, are ſufficient to give a general idea of them: " But I take upon me to aſſign the origin and ſource of ſuch artifices, and deliver my opinion about the uſe of them." For the reaſon abovementioned I ſhall paſs over what our author ſays, about the origin of ſuch muſical artifices, ariſing particularly from notes of double uſe; and only mention his rule for uſing them, which cannot be too much inculcated; viz. that they can never have a good effect, but when the harmony does not quit the tone propoſed, i. e. the key, which ought to be the principal object. " In a compoſition," ſays he, " regulated by the tone propoſed and eſtabliſhed, I am perſwaded and convinced, that no other artifices of " this nature can have place, but thoſe only which do not depart " from the rigorous modulation belonging to the tone. As to the " occaſions, where all ſuch artifices may be applied in their full " extent, I am of opinion, that they are to be found in the recitatives of an opera, an oratorio, &c.; becauſe recitatives " not only are not tied down to a tone propoſed and eſtabliſhed; " but, on the contrary, are ſubſervient to the compoſer, in order " to diſpoſe and prepare, as he pleaſes, the tone of the airs or

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“ ſongs. Such artifices may ſpecifically and preciſely produce a fine effect, when their force and nature are well underſtood, and they are adapted to proper words, which will always offer themſelves in ſome part or other of a drama. After all that has been ſaid relating to practiſe, it remains to be conſidered, whether ſuch notes of double uſe can demonſtratively ſerve for that purpoſe. It is evident in the higheſt degree that they cannot by any means, becauſe the difference between the hemitone minor and hemitone major is too great. It is true, the ſame touch of the harpſichord ſerves for $D^{\sharp}$ and E^{b}, but reaſon makes a great difference between them; and therefore it is demonſtratively impoſſible, that the two above-mentioned notes may be uſed interchangeably for one another. The ſame reaſon may be applied to all other notes of double uſe: therefore, demonſtratively, ſuch notes cannot ſerve for ſuch a purpoſe, for which they are practically made to ſerve.” There may perhaps appear, at firſt ſight, a contradiction in Tartini, when he ſays, that ſuch uſe of notes, though not allowed of by reaſon, yet will have a fine effect on certain occaſions: But if we ſuppoſe him to mean, that ſuch notes cannot be uſed indifferently for one another, but that they may be uſed, when we do not depart from the harmony of the tone propoſed, as he ſaid above, the contradiction vaniſhes. Here ends the ſixth and laſt chapter of the original; and we now come to what he calls the concluſion, which conſiſts of ſome obſervations of his own on the foregoing treatiſe.

CONCLUSION.

§ 165.

Want of a practical tract on muſic.

I intend to give ſome account of this laſt part, without entering into a diſcuſſion of his principles, which he undertakes to defend againſt ſome objections; for neither the objections nor the anſwer to them affect me. After having obſerved, that his ſyſtem is founded, not on fictions of the mind, but on realities; ſuch as the

CONCLUSION.

the 3d ſounds, which reſult from two or more ſounds; the ſounds ariſing on the monochord; the ſounds of conſent, which reſult from certain given figures of bodies, &c.; he proceeds thus: "I do not pretend, however, to have made a compleat work, "with all poſſible particular deductions: For ſuch a purpoſe, "not a ſmall tract, but a large volume, would have been neceſſary, which you, Sir, diſlike as much as I can do. That ſuch "a volume is wanted, in which the ſcience and art of counterpoint ſhould be contained, and the whole thoroughly compleated, and in a plain manner brought down to the capacity "of the common muſical profeſſor, I do readily allow; and the "man perfectly equal to ſuch a taſk lives now amongſt us. I "ſincerely wiſh, that, for the benefit of the profeſſion, he may "be diſpoſed to undertake it; as all the muſical precepts hitherto "publiſhed have no foundation but practiſe only. I cannot "ceaſe wondering, when I conſider how far human ſentiment "has gone in this affair. It is certain that, many ages ago, men "began to compoſe; it is certain that, in all theſe ages, there "has not appeared one ſingle tract, which demonſtrates the true "principles of harmony, and from them deduces the rules of "counterpoint; it is certain alſo, that theſe principles being at "laſt diſcovered, and the principal rules being deduced from "them, it appears that practiſe, by the mere force of genius, "has hit upon the principal rules. We muſt from hence conclude, that muſic is congenial to us, and that harmony is analogous to human reaſon.

§ 166.

Harmony, if unknown, deducible from Tartini*'s principles.*

"Here perhaps you may aſk me, Whether, ſuppoſing there "was no ſuch thing as muſical harmony known, by vertue alone "of this ſcience the ſame muſical harmony might be deduced, "as has been deduced from ſentiment? I anſwer, that I think "ſuch a deduction would be more than poſſible. The method

" uſed by me is relative to your commands : You inſiſted upon " having a ſcientifical account of harmony, upon ſuppoſition of " the exiſtence of harmony, and of nothing more ; and I am apt " to believe I have ſucceeded. For the reſt, when you reflect " on the ſpirit and ſubſtance of this treatiſe, you will ſee evidently the poſſibility of ſuch a deduction, independant upon " ſentiment. However, whether it is better to follow ſentiment " rather than ſcience, or the contrary, I do not decide. I conſider, that ſentiment is real, and that ſcience is alſo real : I " therefore conclude, that it is beſt to join ſentiment to ſcience ; " but I confeſs ſincerely, at the ſame time, that ſuch a ſcience, " deduced from ſuch principles, and eſtabliſhed in ſuch a manner, is fitter for a philoſopher than a practical muſician, and " therefore full of difficulties for any one. I am perſwaded, that, " if it comes to be publicly known and cultivated, time, ſtudy, " farther diſcoveries, and obſervations, will produce a greater " facility, joined to the greateſt utility, in two reſpects : One is, " that the human ſentiment, ſupported by real ſcience, and aſſiſted by phyſical truths, that are inſeparable from it, would " be better explained, and rendered more extenſive ; from thence " we might derive hopes of arriving, by another road, to that " point which the antients arrived at. The other advantage is, " that a diſcovery might be made, one of theſe days, what and " how great the extent of phyſico-harmonic ſcience is, of which " muſic is but a ſmall part. Many learned and profound ſcholars have intereſted themſelves in muſic, conſidered in that " point of light, and which they looked upon as the true one ; " and in conſequence have advanced and deduced things true, " wonderful, and worthy of the higheſt praiſe. When it comes " to be looked upon in this new light, which in relation to harmony, I am convinced, is the only true and legitimate one ; " and men of learning will deign to intereſt themſelves again ;

CONCLUSION.

" they would know, much better than I can do, that things of " more weight, I may ſay, of the greateſt importance, are contained in it. But this does not appertain to me, who am only " intereſted to ſerve you in your particular inclination.

§ 167.

Rules deducible from Tartini*'s principles.*

" I return therefore to my buſineſs; and affirm, that when " you have examined, in your own rigorous method, the ſubſtantial parts of the ſyſtem, and find that it ſtands the trial perfectly, you will make your own particular deductions; and I " am certain that you will form ſuch as are juſt and true; and " that nothing will eſcape your conſideration. If I ſay, for " example, that the rule which forbids us to uſe two ſucceſſive " octaves, and two ſucceſſive 5ths, between the parts of the " harmony, derives its principle not only in general from the " two ſyſtems, harmonic and arithmetical, in which the ſucceſſive ratios are always different; but ſpecifically from the duple " and ſeſquialter, as fundamental ratios of the harmonic ſyſtem; " and therefore, on account of their dignity and ſignificancy, entirely diſtinct from other ratios: If I ſay, that the rule of contrary motions between the parts has its foundation in the muſical example, fig. 1, example 3; in which not only the contrary motion, when compared with example 2, is evident; " but there is moreover the indication of the law of ſuch progreſſion from note to note, which, by degrees, or by jumps, " are allowed between the parts and the baſe: If I ſay, the law " for forming real ſubjects (a diſtinct artifice, and the ſource of " many others) ariſes ſubſtantially from the harmonic and arithmetical diviſion of the octave; and therefore the octave being " divided harmonically thus, C G C, if C G is propoſed, G C " ought to follow; and ſo, if the octave being divided arithmetically thus, C F C, if C F is propoſed, F C ought to follow: " If I ſay either this or any other thing, by way of occaſional

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“ example, I am ſenſible I ſay nothing but what is merely ſuperfluous for you. I repeat, therefore, that if you, illuſtrious Sir, find the preſent ſyſtem true, you will have, conſidering your ſagacity and profoundneſs, an opportunity of making deductions for many years to come; and I have reaſon to believe, that, you being young, and I old, you will go on making deductions when I ſhall no longer be in the land of the living. Whatever happens, as long as I do live, I ſhall live devoted to you, from duty, reſpect, and inclination; and therefore always diſpoſed to obey your commands, as I have done on this occaſion.” Thus ends Tartini's treatiſe on muſic; but I cannot quit the ſubject without adding a few ſelected obſervations, which I could not introduce into the body of the work, without interrupting the main buſineſs too much; ſome, perhaps, will think I have done ſo already: but, however that may be, here follows the Appendix; after ſaying of my great guide and conſtant inſtructor, what Petavius ſaid of Scaliger, whom he had criticiſed with great ſeverity,

DUM ERRAT DOCET.

APPENDIX.

§ 168. *Ægyptian muſic.*

I SAID, § 54, that the art of muſic was undoubtedly firſt begun in Ægypt, and from thence propagated over the reſt of the world, wherever any true muſic has been known. This aſſertion, I am ſenſible, will ſeem very ſingular, and perhaps raſh, to thoſe who remember what Diodorus Siculus, lib. i, ſays, viz. 'that 'it was not the cuſtom, amongſt the Ægyptians, to learn muſic; 'for that they looked upon it not only as uſeleſs, but noxious, 'being perſuaded that it rendered the minds of men effeminate.' This paſſage of Diodorus has had ſuch weight with all the writers on muſic, whom I have had an opportunity of conſulting, that they ſeem to have been convinced, that the Ægyptians did not apply themſelves to muſic. Yet, if we may give credit to a much better authority, as to every thing that relates to Ægypt, this opinion is without foundation. Plato, who travelled into that country, with a view of getting acquainted with the arts and ſciences that flouriſhed there, tells us quite another ſtory. Now we cannot ſuppoſe him to have been negligent in getting information about an art of which he was particularly fond, as is known to every one who has looked into his writings. Let us hear then what he ſays on this ſubject.

§ 169. *An account of Ægyptian muſic, out of* Plato.

'Athen. The plan which we have been laying down for the edu- 'cation of youth, was known long ago to the Ægyptians, viz. that 'nothing but beautiful forms and fine muſic ſhould be permitted 'to enter into the aſſemblies of young people. Having ſettled

‘ what thoſe forms and muſic ſhould be, they exhibited them
‘ in their temples; nor was it allowable for painters, or other
‘ imitative artiſts, to innovate or invent any forms different from
‘ what were eſtabliſhed; nor is it now lawful, either in painting,
‘ ſtatuary, or any of the branches of muſic, to make any alteration.
‘ Upon examining, therefore, you will find, that the
‘ pictures and ſtatues made 10,000 years ago, are not only not
‘ 10,000 times, but not a jot, better or worſe, than what they
‘ make now. Clin. What you ſay is wonderful. Athen. Yes;
‘ It is in the true ſpirit of legiſlation and policy. Other things
‘ practiſed amongſt that people may, perhaps, be blameable;
‘ but what they ordained about muſic is right; and it deſerves
‘ conſideration, that they were able to make laws about things
‘ of this kind, firmly eſtabliſhing ſuch melody as was fitted to
‘ rectify the perverſeneſs of nature. This muſt have been the
‘ work of the Deity, or of ſome divine man; as, in fact, they
‘ ſay in Ægypt, that the muſic which has been ſo long preſerved,
‘ was compoſed by Iſis, and the poetry likewiſe.’ Plat. p. 789.
This teſtimony of Plato contains a full anſwer to Diodorus; for it appears, that the Ægyptians were ſo far from neglecting muſic, that they laid the greateſt ſtreſs upon it. The only queſtion then is, how far they carried that art, which ſhall be the next conſideration.

§ 170.
Hermes *invented the heptachord.*

It is univerſally agreed, that the Hermes of the Greeks was the Thoth of the Ægyptians; and therefore I ſhall produce no proofs of the truth of this opinion. That the Græcian Hermes invented the ſeven-ſtringed lyre is alſo generally believed; vide Hom. hymn in Merc. v. 51; Lucian Dialog. Apoll. et Vulc.; Schol. in Arat. artic. Χελυς.—Nicom. Man, lib. ii, ſays thus:
‘ It is related, that Mercury invented the lyre, which he made
‘ of a tortoiſe, and having put ſeven ſtrings to it, gave it to Or-

'pheus, and taught him how to uſe it. Orpheus taught Thamyris and Linus to play upon it; and Linus taught Hercules, by whom he [Linus] was killed. Orpheus alſo taught Amphion, who built Thebes, with ſeven gates, to the ſounds of his ſeven ſtrings. When Orpheus was killed by the Thracian women, it is ſaid, his lyre was thrown into the ſea, and carried to Antiſſa, a city of Leſbos, and that ſome fiſhermen happening to meet with it, gave it to Terpander; who, having adorned it very finely, took it with him into Ægypt, and ſhewed it to the prieſts there, and gave himſelf out as the inventor.' I choſe to give this account at length, as it exhibits a ſtriking ſpecimen of the genius of the Greeks, who had full as much vanity as ingenuity; which is ſaying a great deal of both. In ſpite therefore of this ridiculous claim, we muſt allow the Ægyptians to have been the inventors of the heptachord; and if this was the caſe, nothing more is neceſſary to make good my aſſertion, that the art of muſic was begun in Ægypt, &c.: For, as ſurely as the Greeks learned it of the Ægyptians, ſo ſurely did the Romans learn it of the Greeks, and the reſt of the world of the Romans.

§ 171.

Probably the octachord alſo.

But it will be objected, that the muſic propagated over Europe has not been that conſiſting of ſeven ſtrings only, which is Ægyptian; but that conſiſting of eight, or more, which is Græcian, as being invented by Pythagoras. To this objection I anſwer, that I mentioned, § 13, ſome ſuſpicions why I think his claim not quite clear: Amongſt the reſt, I cited a paſſage out of Plutarch, about the diviſion of the ſeaſons of the year, which plainly alludes to the numbers of the octave. This diviſion is ſaid, by Ariſt. Quint. p. 145, to have been the invention of Pythagoras; but he is certainly miſtaken; for making ſpring as 6, autumn as 8, winter as 9, ſummer as 12, we ſhall have 62, 83, 93, 125 days nearly for thoſe ſeaſons reſpectively; which may probably be right for Ægypt or Chaldæa, but certainly not for Greece; where, according to Euripides, and the concurrent teſtimony of the old writers, ſpring and autumn conſiſts each of 60, winter and ſummer each of 120 days nearly. But Pythagoras, who was, if not 22 years, as Iamblichus ſays, yet certainly a long time, amongſt the Ægyptians, and being initiated in their myſteries, was better acquainted with their learning than any other foreigner whatever, in all probability firſt taught his countrymen the octave expreſſed by 6, 8, 9, 12; and from thence the very invention of it was attributed to him. However, to ſupport my aſſertion, it is not neceſſary to ſuppoſe the Ægyptians to have invented the two disjunct tetrachords. We may have a great variety of very fine muſic with ſeven notes only; at leaſt the Greeks thought ſo; for no more notes were uſed in the Dorian, Phrygian, and Lydian modes practiſed by Anacreon; vide Athenæum, p. 635; and Pindar mentions his lyre as having only ſeven ſtrings, Pyth. 2, 130, et Nem. 5, 43: Yet both theſe poets, who were nearly of the ſame age, lived after the ſuppoſed diſcovery of Pythagoras; and Pindar, particularly, wrote the ſecond Pythian ode above 60 years after that philoſopher was famous. So much for my aſſertion, § 54.

§ 172.
Advantages of the octachord.

I will take this opportunity of obſerving, that the advantage ariſing from the octachord of Pythagoras conſiſted in this, that whereas in the heptachord, where two tetrachords were joined together without an intermediate tone, you could not add another ſimilar tetrachord, without going out of the key; in the octachord, on the contrary, you may add as many ſimilar tetrachords as you pleaſe, and ſtill keep in the ſame key. This will become evident by conſidering fig. 10; where B, C, D, E; E, F, G, A, are two ſimilar conjunct tetrachords; for from B to C is a hemitone, and from E to F is alſo a hemitone; from C to D, as from F to G, is a tone, &c.; and the key is C. Add now another ſimilar conjunct tetrachord, viz. A, B, C, D, and it is clear that B muſt be lowered, in order to get the hemitone required; and thus the key is altered; for we are now got into F. B, thus lowered, is called B fa, and the ſcale, ſcala mollis; as the other in C is called ſcala dura; but they are both in the 3d major.

§ 173. *Ægyptian ſculpture and painting.* Norden.

We have no method left of getting any idea of the old Ægyptian muſic, but by ſuppoſing (what I believe is always the caſe, and to the diſgrace of conceited ignorance has hitherto proved to be ſo) a proportional degree of perfection in arts of a ſimilar nature, as muſic, painting, and ſculpture, may truly be ſaid to be. If this ſuppoſition may be allowed, there are remains in Ægypt of the two laſt-mentioned arts, ſufficient to enable us to form a judgment of their muſic; and ſuch remains as will furniſh us with a very favourable idea of it. Many teſtimonies might be produced on this occaſion; but I ſhall confine myſelf to two only, who, from their known character, are fully adequate to my purpoſe. Norden, Voiage en Egypte, p. 102, mentions 'obeliſks 'adorned with hieroglyphics, that one beholds with admiration;' p. 170, ſpeaking of ſome hieroglyphics, 'agreeable,' ſays he, 'to behold at a diſtance; and when one is near, the colours 'have a charming effect:' Again, ibid. 'It is ſurpriſing to ſee 'how the gold, the ultramarine, and other colours, have pre'ſerved their brilliancy to this time. Perhaps I ſhall be aſked, 'How all theſe lively colours could be ſo blended together? I 'own, I cannot tell.' Again, p. 173, 'A coloſſal head, dreſſed 'in the antient Ægyptian taſte, finiſhed with a great deal of art 'and patience, with a ſimplicity that is charming; which makes 'me believe it came from the hands of a great maſter.'

§ 174.
Ægyptian ſculpture.
Caylus.

M. le Comte de Caylus, Antiquités Ægyptiennes, &c. Vol. I, p. 4, ſays, ‘ It muſt be owned, the Ægyptian ſculptors felt and expreſſed grandeur ; and it is in this that the chief and moſt eſſential part of their art conſiſts ; becauſe this alone raiſes the mind of the ſpectator.’ Such a teſtimony, from ſuch a judge, is a ſufficient anſwer to any objections about the excellence of the Ægyptian taſte in the fine arts ; and I might leave every unprejudiced reader to draw his concluſions. But there is another paſſage in Caylus, which I cannot omit producing on this occaſion, as it confirms what I cited out of Plato, § 169 ; and as the paſſage in Plato ſolves a difficulty which Caylus ſeems at a loſs how to account for : ‘ Arts,’ ſays he, ‘ being progreſſive in all other countries, we cannot but ſuppoſe that they were ſo amongſt the Ægyptians ; yet their works, ſo far from favouring ſo natural a preſumption, have always offered me hitherto an equality of taſte, form, and workmanſhip, which ſurpriſed me. I imagined, therefore, that I ought to attribute this uniformity to a prodigious antiquity, which hindered their firſt works from coming down to us. I imagined, afterwards, that the proportions being once known and admitted, ſuperſtition and ſcruple had laid an obſtacle in the way of that ſucceſſive progreſs, to which nature and practiſe lead, in a country eſpecially, which, knowing nothing in general but its own productions, was antiently deprived of the aſſiſtance that ariſes from compariſon. With this idea, which was formed upon objects that I had under my eye, I have more than once mentioned with an elogium the equality of proportions obſerved by the Ægyptians.’ He then gives an account of a figure of the higheſt antiquity, without beauty or proportion ; and this he takes for a proof, that art had, in Ægypt as well as in other countries, its progreſs towards perfection. No doubt it had : But that degree of perfection, which ſatisfied the Ægyptians, had long been obtained, though not 10,000, yet perhaps above 2000 years, before the time of Plato; and this paſſage out of Caylus confirms Plato's account.

§ 175. *Greek muſic, its effect.*

Tartini barely mentions, vide § 91, the names of Plato and Ariſtotle, as vouchers and witneſſes of the effect of antient muſic on the paſſions. I intend to go farther, and not only give ſome account of what theſe two philoſophers ſay, but alſo to add the teſtimony of other grave and credible witneſſes; in order to confirm what has been doubted of, even by men who had no prejudices againſt muſic in general, or that of the Greeks in particular. But that what I ſhall have to ſay on this ſubject may have its proper weight, in relation to the merit of the antient muſic, it will be neceſſary firſt to remove ſome difficulties, ſtarted by one of great authority; I mean, that moſt acute mathematician Dr. Wallis; who, I ſuppoſe, knew more of the antient muſic than any modern, except Meibomius. The former, in Philoſophical Tranſactions abridged by Lowthorp, Vol. I. p. 618, ſays thus: 'I take it for granted, that much of the reports concerning the 'great effects of muſic in former times, beyond what is to be 'found in latter ages, is highly hyberbolical, and next to fabu'lous; and therefore great abatements, &c.' This firſt article is merely taken for granted, and prefatory. The ſecond article gives for reaſon 'that muſic (to any tolerable degree) was then, '(if not a new, at leaſt) a rare thing; which the ruſtics, on 'whom it is reported to have had ſuch effects, had never heard 'before; and on ſuch, a little muſic will do great feats; as 'we find at this day a fiddle or a bagpipe at a country morrice'dance.'

§ 176. *Greek muſic vindicated.*

To ſpeak freely on this occaſion, I cannot help being amazed to find ſo crude an opinion delivered by a man of Dr. Wallis's character, on a ſubject, which, as appears by his excellent edition of Ptolemy, employed his thoughts very much. Had he confined this unfavourable judgment of the antient Greek muſic to ſome fabulous accounts which we meet with here and there, about its effect on various kinds of animals; as, wolves, elephants, mares, wild boars, deer, dolphins, &c. it would hardly have been worth while to contradict him; though ſome of thoſe ſtories are moſt undoubtedly founded on truth; becauſe they do not ſo much prove the excellence of the muſician, as the exquiſite workmanſhip of the great Author of nature. Had Dr. Wallis's cenſure gone no farther than this, I ſhould have ſaid nothing about it; but when I conſider that it throws a ſuſpicion on the teſtimony of the greateſt men of antiquity, I cannot but think it deſerves ſome examination. When I ſay the greateſt men, I mean ſuch as had the higheſt reputation in the moſt enlightened times of Greece, i. e, the moſt enlightened times that the annals of the world mention. I ſhall not at preſent cite the opinion of thoſe great men about the effect of muſic. This I ſhall mention afterwards. I ſhall now only conſider in a general way what probably muſt have been the ſtate of muſic in the time of Plato and Ariſtotle, who are the chief authors that give ſuch incredible accounts of its effects.

§ 177.

Muſic not rare in the time of Homer.

Homer lived above 400 years before the philoſophers abovementioned, according to the account which brings them the neareſt together. Does it then appear that muſic, even in his days, was a rare thing? So far from it that we have an account of muſic in various ways, perpetually occurring in his poems, particularly in the Odyſſey, which has been juſtly called Κατοπτρον τȣ ϐιȣ ανθρωπινȣ; and which we may therefore ſuppoſe to give a true picture of what he daily ſaw before his eyes. In the Iliad and Odyſſey together there are above fifty places where muſic is mentioned;

APPENDIX. tioned; in ſome of which the tibia and cithara are employed—In ſome ſinging and playing on inſtruments are called the companions and ornaments of a feaſt—In others reſponſive choral ſinging at a funeral is deſcribed—In others ſinging to the cithara to cheer the labourers at a vintage—In others, Apollo preludes, and the Muſes ſing alternately—In others, Phemius or Demodocus performs a kind of muſical drama, or what ought rather perhaps to be called a cantata, with a regular ſubject: from whence I conclude that the muſic muſt at leaſt have been tolerable; for we cannot ſuppoſe that Homer would have thought it worth while to celebrate even good poetry, accompanied with ſuch wretched muſic as a bagpipe can produce. Nay, we cannot, without being extravagant, ſuppoſe that barbariſm and civility could be ſo abſurdly coupled together, whatever ſeeming proofs, either antient or modern, may have been produced to the contrary.

§ 178. *Nor after him.* After Homer ſome of the firſt writers were the Lyric and Dithyrambic poets, as the two Alcmans, Simonides the elder, Terpander, Arion, Steſichorus, Sappho, &c. and theſe were of courſe practical muſicians and compoſers; and we muſt neceſſarily ſuppoſe that muſic was rather improved than the contrary, under ſuch maſters. Next came the theatrical poets, and they too ſet their own pieces to muſic; and that the Greek tragedy was throughout ſet to muſic, appears by a paſſage in Ariſtotle, which is the only teſtimony I ſhall quote in proof of my aſſertion: 'The Hypodorian and Hypophrygian modes are improper for the chorus, but more ſuitable for the ſcenic perſonages.' Vol. 2. 770. problem. I may perhaps have occaſion to mention Ariſtotle's reaſons for this opinion afterwards.

§ 179.

Muſic not rare in Greece.

But again, muſic was ſo far from being *rare* at the time when the authors lived who give an account of its wonderful effects, that it was a regular part of education. This is ſo well known a fact, that to undertake to prove it would be a mere oſtentation of reading. Every ſchool-boy knows what Cornelius Nepos ſays of Epaminondas; and the ſtory of Themiſtocles related by Cicero, is almoſt as well known. Inſtead therefore of citing ſuch trite inſtances, and fifty others ſimilar to them, I will give one from amongſt a people who are frequently repreſented as rather averſe to the ſtudy of muſic. Xenophon, p. 661. ſays, that Ageſilaus at the ſolemn feſtival, called Hyacinthia, performed his part in the Pæan ſung to Apollo, being appointed thereto by the maſter of the chorus. From hence it appears that muſic muſt have made a part of education amongſt the Lacedemonians, otherwiſe we cannot ſuppoſe that one of their kings could, with any decency, have been appointed to ſing on a public occaſion. This ſtory would afford many reflections; but I have no room left to wander into all the paths where my copious ſubject would lead me.

§ 180.

Muſic corrupted in the time of Ariſtoxenus.

What ſhall we ſay to the paſſage cited by Athenæus out of Ariſtoxenus, p. 632.? ‘ I and a few others, recollecting what ‘ muſic once was, and conſidering what it now is, as corrupted ‘ by the theatre, act like the people of Poſidonium, who annually ‘ celebrate a feſtival after the Greek manner, in order to keep up ‘ the memory of what they once were; and before they depart, ‘ with tears deplore the barbarous ſtate they are brought into by ‘ the Tuſcans or Romans.’ Is not this paſſage a convincing proof that muſic muſt have been carried to a great degree of perfection as early as the time of Plato and Ariſtotle? What ſhall we ſay about the care of the Greek muſicians in adjuſting the modes, inſtruments, and rhythm together; and this with a ſcrupulous exactitude, that ſavors to us of whim and affectation. Inſtances of this ſort abound in the ancient writers. Is it uſual for arts that are little underſtood, and only practiſed amongſt ruſtics, to be ſo very nice? What ſhall we ſay to the cuſtom amongſt the Athenians of erecting monuments with tripods in honor of the tribe which gained the prize in a chorus, where the names of the furniſher and teacher, the number of performers, and whether men or boys, were recorded? Was muſic rare when a whole people contended thus with one another by bodies, which of them could produce the ableſt muſicians? Or can we ſuppoſe the muſic to be ordinary, or even indifferent, when it was ſtudied by ſo many ingenious rivals? Let any one conſider all theſe circumſtances, and decide whether it is poſſible to reconcile them with Dr. Wallis's opinion; who, after having obſerved that muſic with the ancients took in poetry, dancing, geſture, as well as ſinging and playing; ſays thus: 'Now all this together muſt needs operate ſtrongly on 'the fancies and affections of ordinary people, unacquainted with 'ſuch kind of treatments.'

§ 181. *Antients had muſic in parts.*

'But,' ſays Dr. Wallis, 'the antients had not conſorts of two, 'three, four, or more parts or voices.' Maibomius aſſerts much the ſame thing; and this is, one may almoſt ſay, the univerſal opinion. Some, however, of the writers on muſic have produced paſſages out of the antients, which ſeem to imply the contrary; but which are not looked upon as concluſive by others: Such as that out of Seneca, Epiſt. 84: 'Non vides quam multorum vo'cibus,' &c. mentioned by Iſ. Voſſius de Poemat. Cant. &c. p. 82; where perhaps nothing but octaves are implied. Another paſſage cited by him, out of the piece de Mundo, attributed to Ariſtotle, ſeems to be more to the purpoſe *μουσικη οξεις*, &c. i. e. muſic, mixing together acute and grave, long and ſhort ſounds, forms one harmony out of different voices. Wallis alſo has produced a paſſage out of Ptolemy, which he thinks may infer muſic in parts. Ptol. Harm. p. 317. But the ſtrongeſt paſſage which I have met with, in relation to this long-diſputed point, is in Plato; a paſſage which I have never ſeen quoted, and which I ſhall tranſlate: ‘ Young men ſhould be taught to ſing to the lyre, ‘ on account of the clearneſs and preciſion of the ſounds, ſo that ‘ they may learn to render tone for tone. But to make uſe of ‘ different ſimultaneous notes, and all the variety belonging to ‘ the lyre, this ſounding one kind of melody and the poet ano- ‘ ther—to mix a few notes with many, ſwift with ſlow, grave ‘ with acute, conſonant with diſſonant, &c. muſt not be thought ‘ of; as the time allotted for this part of education is too ſhort ‘ for ſuch a work.” Plat. 895. I am ſenſible, that objections may be made to ſome parts of this tranſlation, as of the words πυκνοτης, μανοτης, and αντιφωνοις; but I have not deſignedly diſguiſed what I took to be the true ſenſe of them, after due conſideration. It appears then, upon the whole, that the antients were acquainted with muſic in parts, but did not generally make uſe of it.

§ 182.
Stories about Orpheus.

But Dr. Wallis enters into particulars, and objects to the ſtories about Orpheus, Amphion, Timotheus, &c. Now, what is ſaid about the two firſt of theſe muſicians, is ſo plainly poetical, that a child cannot miſtake it; and perhaps may only mean, that men were incited and encouraged to work by the power of their muſic; as Nicomachus indeed ſeems to ſay nothing more, in the paſſage about Amphion cited § 170; and as the Argonauts are ſaid, by Apollonius Rhodius, to have been incited to row by the lyre of Orpheus. This kind of encouragement was not unuſual amongſt the antients. Homer mentions a boy ſinging, and playing on the cithara, to the labourers at the vintage; and Euripides, a muſician, playing on the pipe to the rowers; Iphig. in Taur. v. 1125. This, I ſay, might poſſibly be the whole that was meant by the ſtories about Orpheus and Amphion. But we are not obliged to confine ourſelves to that meaning, as we have ſufficient reaſon to believe that their muſic was uncommonly touching, and capable of producing any effect almoſt within the limits of poſſibility. The reaſon we have for thinking thus highly of their muſic, is not drawn from theory, which is a moſt deceitful guide in caſes of this kind; though the only one which Dr. Wallis had or could have to follow. No, we ſtand upon other, and better ground, and ſuch as may be firmly relied upon; I mean the teſtimony of ſome who heard, if not the muſic of Orpheus and Amphion, yet that of muſicians full as old.

§ 183. *Muſic of* Olympus.

Plato, ſpeaking of the muſic which remained in his time, of Marſyas and his diſciple Olympus, ſays, p. 567, 'that it was moſt divine, and adapted in a very particular manner to ſtir and affect the mind.' This teſtimony of Plato, who was himſelf a practical muſician, and lived at a time when muſic flouriſhed in an eminent degree, ought to have great weight. Again, Ariſtotle ſays, p. 455. that the compoſitions of Olympus raiſed an enthuſiaſm in the ſoul. Laſtly, the muſic of Olympus was preſerved to the days of Plutarch, who ſays, it ſurpaſſed any muſic then known. Now, Olympus was at leaſt as old as Orpheus; and it was he who compoſed the *curule* ſong, Plutarch, p. 1133, which cauſed Alexander to catch up his arms, while Antigenidas was performing it; Id. p. 335. As to the effect of the recent muſic in the time of Plato and Ariſtotle, they both ſpeak of it in very ſtrong terms. Plato, after mentioning, p. 906. ſeveral of the modes then in uſe, excludes ſome, and admits others into his republic, on account of their different effects on the morals; and Ariſtotle ſays, p. 770. vol. 2. that the Subphrygian mode affects the mind with ſomething like madneſs, and drives it into a kind of Bacchanalian ſtate. ibid. p.

455. That the Phrygian mode raiſes enthuſiaſm. ‘ This,’ adds he, ‘ is rightly affirmed by thoſe who are converſant in things of ‘ this kind ; for they ſpeak from what they ſee actually happen.’ It appears then that the two above-mentioned philoſophers perfectly agree in their opinion about the power of muſic, and the propriety of making it a part of education ; though the diſciple takes every occaſion to contradict his maſter, eſpecially in relation to his republic. It is curious to obſerve the different motives they make uſe of to recommend muſic. Plato, who was given up to the ſublime of ſpeculation, ſays, that muſic accuſtoms the mind to order, and thereby allures it to the love of vertu ; which is nothing but moral order ; and ſo raiſes it gradually to the contemplation and love of that being, who alone is the ſource of all order, both natural and moral. This was the way of reaſoning of that great philoſopher ; and the ſame way of reaſoning made him recommend the ſtudy of aſtronomy, and of the ſciences ſubſervient to it, as arithmetic and geometry. He thought, all other views but that, beneath the dignity of man. His diſciple, Ariſtotle, talks more like a man of the world on this occaſion, as he does in all other parts of his philoſophy ; and ſays, we ſhould not only be taught to do buſineſs with honor, but alſo, to be idle with dignity ;—that it is unworthy of a gentleman to make profit the only view in all purſuits ;—that it is ſcarcely poſſible to judge rightly, in any art which we have not practiſed ; and therefore, in order to qualify people to be pleaſed with nothing but what is fine in muſic, they muſt practiſe it in their youth ;—that, as young folks can never be at reſt, their parents ought to provide them with ſome innocent amuſement ; as Archytas contrived a rattle for children, in order to keep them from doing miſchief.

§ 184.

The power of antient muſic proved from teſtimony.

But to return to my main purpoſe, which was to ſhew, that the ſtories mentioned, about the effect of the antient muſic, were not owing either to its ſcarcity, or the ruſticity of the audience. This point, I imagine, muſt appear very evident to any impartial reader, by what I have already ſaid; but, if it were neceſſary, I could with the greateſt eaſe produce the teſtimony of poets, hiſtorians, ſoldiers, ſtateſmen, lawyers, divines, philoſophers, of the higheſt character for wiſdom and gravity, living in ſeveral ages and countries, all concurring to confirm the opinion of Plato and Ariſtotle; and, what is extraordinary, I do not remember that Lucian, who takes every opportunity of expoſing the philoſophers, ever once ridicules them for it. If all theſe circumſtances are not ſufficient to gain our belief, merely becauſe we moderns have not the ſame muſical power; then have the Kamſchatcans a right to decide, that it is impoſſible to foretell an eclipſe; or to repreſent all the elements of ſpeech, by about twenty-four marks.

§ 185.
Lacedæmonian *ſenatus-conſultum.*

Though I think it unneceſſary to produce the opinion of any other private perſon on this ſubject after thoſe I have already mentioned; yet it may not be amiſs to produce the judgment of a nation; and I the rather produce it, becauſe, beſides the weight it muſt carry, it contains a curious piece of antiquity. The piece I mean is a ſenatus-conſultum of the Lacedæmonians preſerved in Boethius; and is as follows: WHEREAS TIMOTHEUS, THE MILESIAN, COMING TO OUR CITY, HAS DEFORMED THE ANTIENT MUSIC; AND LAYING ASIDE THE USE OF THE SEVEN-STRINGED LYRE, AND INTRODUCING A MULTIPLICITY OF NOTES, ENDEAVOURS TO CORRUPT THE EARS OF OUR YOUTH BY MEANS OF THESE HIS NOVEL AND COMPLICATED CONCEITS, WHICH HE CALLS CHROMATIC; BY HIM EMPLOYED IN THE ROOM OF OUR ESTABLISHED, ORDERLY, AND SIMPLE MUSIC; AND WHEREAS, &C. IT THEREFORE SEEMETH GOOD TO US THE KING AND EPHORI, AFTER HAVING CUT OFF THE SUPERFLUOUS STRINGS OF HIS LYRE, AND LEAVING ONLY SEVEN THEREON, TO BANISH

THE SAID TIMOTHEUS OUT OF OUR DOMINIONS, THAT EVERY ONE BEHOLDING THE WHOLESOME SEVERITY OF THIS CITY MAY BE DETERRED FROM BRINGING IN AMONGST US ANY UNBECOMING CUSTOMS, &c.

§ 186. *Obſervations on the Senatus-conſultum.*

I have not produced the whole, nor do I pretend to have given a literal tranſlation of this remarkable ſenatus-conſultum, which has been very much corrupted by tranſcribers. I have taken the ſenſe of it as corrected by Iſ. Caſaubon in his notes on Athenæus. The corrections are highly probable, but not ſufficient to furniſh throughout a grammatical conſtruction; for which reaſon I aimed at nothing farther than the general ſenſe, which I muſt obſerve for the ſatisfaction of the Engliſh reader is clear enough, even without Caſaubon's corrections. I muſt farther obſerve upon this occaſion, that this is the very Timotheus who is ſaid by ſome to have produced ſuch an effect on Alexander by his muſic—that this was the third time that the Lacedæmonians had in much the ſame way put a ſtop to any innovation in muſic, as thinking it of the greateſt conſequence to the ſtate. Plutarch. Inſtitut. Lacon. p. 239. vol. 2. et id. p. 799. vol 1. That only ſeven ſtrings were uſed long after the octachord was ſettled by Pythagoras; vide § 171—that the chromatic was looked upon as unbecoming a grave and manly people, vide § 150.—And laſtly, that it appears that the very two nations who are ſuppoſed to have paid very little regard to muſic, viz. the Ægyptians and Lacedæmonians, in fact are found to have laid the greateſt ſtreſs upon it, by making it in ſo particular a manner the object of national concern. Vide § 169.

§ 187. *The power of muſic proved from theory.*

Having ſaid all that I think neceſſary, in point of teſtimony, upon this ſubject, I ſhall now come to theory, and conſider, whether that may not tend to prove the ſame thing. Cicero.

Tuſc. 1, ſays, that Ariſtoxenus thought the ſoul was nothing but a certain tuning of the body, as in the voice and on the lyre, which is called harmony; ſo that, from the nature and figure of the body, various motions are produced, as ſounds are in ſinging. To this it is anſwered, that he was ſo fond of his darling muſic, that he wanted to transfer every thing to that art; and that we can underſtand what harmony means from the intervals of ſounds; but how the figure of the body, without a ſoul, can produce harmony, does not appear. As the works of Ariſtoxenus, where this doctrine was contained, are loſt, it is not poſſible to know whether or not his ſenſe be truly repreſented. Several of the antient philoſophers, eſpecially of the Pythagorean and Platonic ſects, ſuppoſed the ſoul to be made according to harmony. This notion was miſrepreſented by ſome, as if they had ſaid the ſoul was nothing but harmony. Both Plutarch and Proclus take notice of this miſrepreſentation in relation to Plato. By ſoul was frequently meant amongſt the antients, not the rational principle in man, which is capable of perceiving univerſal truths, but a ſubtile kind of matter ſpread over the groſſer body. This kind of matter man was ſuppoſed to have in common with the brutes; it was looked upon, either as itſelf of a ſenſitive nature, or peculiarly adapted to convey the notices of things to the immaterial preſiding mind. This way of conſidering the material ſoul is well illuſtrated by the Stoics, who ſuppoſed it to conſiſt of eight parts; viz. the 5 ſenſes, the 6th the vocal, the 7th the ſpermatic, and the 8th the governing or intellectual part; from which laſt all the other parts are ſpread through their proper organs like the arms of the cuttle-fiſh. Plutar. p. 898, vol. 2.

§ 188. *Nervous ſyſtem.* Ariſtides Quint. de muſicâ, p. 106. exhibits a doctrine ſomething reſembling that of the Stoics juſt mentioned; for he talks of the meninges and nervous membranes, like the ſpider's web, but hollow; containing a ſpirit within them; by which membranes the ſoul, and not the body, is put in motion. How far anatomy had been advanced in the time of Ariſtides, who was contemporary with Trajan, I cannot ſay; but the paſſage above-cited ſeems to ſuppoſe ſome knowledge of the nervous ſyſtem, which is univerſally allowed at preſent to be an expanſion of the brain, from the meninges over all the body. It is alſo univerſally agreed, that the nerves are the organs of ſenſe and motion, but in what manner is diſputed. Baglivi, who was one of the firſt conſiderable writers on this ſubject, once thought that theſe phænomena aroſe from animal ſpirits which paſs through the nerves. Afterwards he changed his mind, and attributed every thing to oſcillation. But to ſtick to the auditory nerves, which at preſent is my only concern, Valſalva, who had made a particular ſtudy of the ear, accounts for the effect of ſounds by the vibrations of the nerves, and compares the nerves to muſical ſtrings. Vide de Aur. humanâ, cap. 6.

§ 189. *Animal ſpirits.*

This theory, however natural it may ſeem at firſt ſight, has been laid aſide by later writers. Haller in his lineæ phyſiologicæ, urges, that the nerves cannot vibrate unleſs they are hard, unleſs they are ſtretched, and unleſs they are fixed. But nothing in them appears of this ſort. Beſides, nerves when cut do not contract; and ſome of them are faſtened down, as thoſe of the heart to the arteries, p. 193. Haller therefore recurs to the old ſyſtem of animal ſpirits, which ſurely is a very unphiloſophical idea, conſidered in any light whatever; for no man will pretend to ſay what theſe ſpirits are—whether any ſpirits paſſing through the nerves do at all exiſt—or whether any ſpirits whatever can anſwer the purpoſes for which they are invented. On the other hand if it is poſſible for a nerve to be put into motion throughout its whole length, by means of ſome impreſſion at either extremity, then every difficulty vaniſhes, in relation to that ſyſtem which ſeems ſo natural; and theſe ſpirits may be remanded back to their native region, where they will be more properly employed to 'tread the ooze of the ſalt deep—to run upon the ſharp wind of 'the north—and to do buſineſs in the veins of the earth—when 'it is baked with froſt;' than to carry intelligence backward and forward between the brain, and the other parts of the body. Let us then ſee what probable ſolution may be found.

§ 190.
Vibrations not neceſſary for muſic.

But before I enter upon this ſubject, I muſt obſerve that Haller's objections relate only to vibrations, ſuch as are produced on a muſical ſtring; and not to all kinds of continued motions whatever. The whole buſineſs therefore is, to find ſome motion in the nerves that is perfectly regular, may be propagated from end to end, and is not liable to the defects mentioned above. If this can be done, one may have as clear a conception how the ſoul receives intelligence by means of the nerves, as how a ſpider ſituated in the midſt of its web, may be made ſenſible of the ſlighteſt impreſſion made on any part of its delicate texture.

§ 191.
Harmonic undulations.

But to come to what I take to be a ſolution of the foregoing difficulties mentioned by Haller. Galileo in his Diſcorſi e Dimoſtrat. Mathem. toward the end of the firſt dialogue, has the following paſſage. 'We plainly ſee the circulation of the medium about 'the reſounding body to diffuſe to a large ſpace, by making a 'drinking glaſs to ſound, that has ſome water in it, by rubbing the 'rim or edge of it with the tip of one's finger; for we ſhall thus 'ſee the water in the glaſs to undulate in a moſt regular order; 'which effect will yet be more clearly ſeen if we put the foot of 'the glaſs in the bottom of a veſſel of reaſonable bigneſs, and fill 'it with water nearly to the glaſs's rim, and then make it ſound by 'rubbing it round as before, with the tip of one's finger: for 'then we ſhall ſee the circulations in the water to be moſt regular, 'and with great velocity to ſpread to a great diſtance round about 'the glaſs: Nay, I have often happened to ſee, in making a 'pretty big glaſs almoſt full of water to ſound as before, the 'waves formed with an exact equality: but the tone of the glaſs 'happening ſometimes to riſe an eight higher; I have ſeen at that 'very inſtant every one of the ſaid waves to divide themſelves 'into two: which accident moſt plainly proves the form of the 'octave to be double.' From this phænomena it follows that harmonic undulations may take place where vibrations cannot; and I think what we ſee happen in animals of the ſerpent kind will help to explain how the nerves may be affected. When animals of that kind move in their natural way, you ſee regular undulations throughout their body. Thus Milton, ſpeaking of the ſerpent, B. ix. v. 496, 'Not with indented *wave*, prone on the 'ground as now:' and v. 502, 'Spires that on the graſs *floated*.'

§ 192. *Soul harmonic.*

If what happens to animals of the ſerpent kind, may happen to the human nerves, i. e. that they may be put into harmonic undulations by the agency of external objects, then was the opinion of Plato, that the ſoul was made according to harmony, not without foundation; which opinion he might perhaps be led into, by ſeeing the extraordinary effects daily produced by muſic, partly owing to a more favourable climate, and partly owing to a ſuperior ſkill in the artiſts of thoſe days. To the ſame purpoſe, Ariſtid. Quint. p. 107. ſays, 'If our minds are affected by the 'vibrations of muſical ſtrings, where is the wonder? ſince the 'mind has a body belonging to it, reſembling a muſical inſtru'ment; and ſince we know that if a light body be placed on a 'ſtring while an uniſon to it is ſounded, the light body will move.' And thus Lord Bacon, either induced by Platonic notions, or by what he ſaw and felt himſelf, even in this unfavourable climate, ſays, Advancem. of Learn. b. 2. 'This variable compoſition of 'man's body hath made it as an inſtrument eaſy to diſtemper;

'therefore the poets did well to conjoin muſic and medicine in Apollo, becauſe the office of medicine is but to tune this curious harp of man's body, and to reduce it to harmony.' But ſomething elſe is required beſides a muſical inſtrument and a muſician, in order to produce the proper effects of muſic. Nobody, I think, will ſcruple to call Æolus's harp a muſical inſtrument; yet every gale will not ſhew the power of it; nor can every voice nor every hand, though muſical, raiſe thoſe undulations in the nerves, which are capable of inſpiring rapture and enthuſiaſm. Perhaps, if every circumſtance beſides was juſt what it ought to be, want of ſimplicity alone might render the effect imperfect. This appears to be Tartini's way of thinking; and even Dr. Wallis lays ſo much ſtreſs upon ſimplicity, that he almoſt ſeems to have been inclined to believe the relations of the effects of antient muſic, at leaſt amongſt the ruſtics, on this account chiefly.

§ 193. *Beaſts affected by muſic.* So much for the human ſoul as far as harmony is concerned. But are the effects of muſic confined to man only? By no means: I will produce a few inſtances of the power of muſic over the brute creation; and ſuch inſtances as cannot be diſputed. It has been mentioned by ſeveral writers, Clemens Alexandrinus, Ælian, Martianus Capella, that deer are affected by muſic; and Waller, in a poem addreſſed to lady Iſabella playing on the lute, alludes to this notion in the following lines:

> There Love takes ſtand, and as ſhe charms the ear,
> Empties his quiver on the liſt'ning deer.

I believe this alluſion has generally been looked upon as a poetical ornament, built upon a fabulous piece of natural hiſtory; I myſelf looked upon it in that light till I met with the following paſſage in Playford's introduction to muſic, who ſeems to have been a plain man, and one whoſe teſtimony might be taken. Thus he ſays: 'Myſelf, as I travelled ſome years ſince near Royſton,

‘ met a herd of ſtags, about 20, upon the road, following a bag-‘ pipe and violin; which while the muſic played, they went ‘ forward; when it ceaſed they all ſtood ſtill; and in this manner ‘ they were brought out of Yorkſhire to Hampton-Court.’—That ſheep are affected by muſic, is no leſs certain. Apollonius Rhodius, lib. 1. v. 574. ſays, ‘ As when a flock of ſheep returning ‘ at evening to the fold, croud about the heels of the ſhepherd, ‘ who walks before, and plays a delightful paſtoral air upon his ‘ ſprightly pipe.’—And ſcripture evidently alludes to this cuſtom in more places than one, as Numbers xxvii. 17. May *lead* the people, that the congregation of the Lord be not as ſheep which have no ſhepherd. Again, Pſal. lxxx. 1. Thou that *leadeſt* Joſeph like a flock. If I am not much miſtaken, this cuſtom ſtill prevails in ſome parts of the Eaſt, and certainly gave riſe to the ſhepherd's pipe, ſo frequently mentioned in the ſcenes of paſtoral life.—Bees, I think, may be put amongſt the animals that delight in muſic. Ariſtotle, vol. 1. p. 948. ſays, what is very well known, that they are drawn together into the hive by the tinkling of braſs, but doubts whether from fear or pleaſure. However others, as Pliny, are of opinion that it is from pleaſure. Lib. 11. § 22. And Varro calls bees, the birds of the muſes; de re ruſticâ, lib. 3. § 16. What to ſay of horſes, I am not altogether without doubt. They are repreſented by ſome writers as delighting merely in the noiſe and claſh of arms; ſo Pindar calls the Sicilian horſes σιδηροχαρμαι, Pyth. 2. 4. and Virgil Georg. 3. 82. Tum ſi qua ſonum procul arma dedere, &c. But I am apt to think the account given in the book of Job is more natural, where the horſe is deſcribed as ſaying among the trumpets, Ha! ha! or, as the Septuagint gives it, Euge! which tranſlated according to our preſent way of expreſſion, means, Bravo! This is fine! It is added indeed, that he ſmells the battle, as appears by his prancing and neighing, according to the verſion of the Septuagint, which ſeems better than that of our bible;

but

APPENDIX. but ſurely his prancing and neighing is accounted for ſufficiently by the ſound of the trumpets. Thus Ovid, ‘ Fremit equus quum ‘ ſigna dedit tubicen.’

§ 194. *Serpents affected by muſic.* I come now to ſome inſtances of the power of muſic on the brute creation, much more extraordinary than any hitherto by me mentioned, and full as well atteſted. It is a common practice in the Eaſt Indies, as I am aſſured, when a hooded ſerpent gets into a houſe, to ſend for a charmer, who with his pipe tempts him out of his hole, and after ſome time lulls him to ſleep, and ſo ſeizes him. Scripture plainly alludes to ſomething of this kind, in Pſal. lviii. 4, 5. Like the deaf adder that ſtoppeth his ears: which refuſeth to hear the voice of the charmer (ἄδοντος), charm he never ſo wiſely. But we have an account in an author of credit ſtill more wonderful. Nieuhoff, (in Churchhill’s Voyages, vol. 2. p. 231.) ſpeaking of Malabar, ſays, ‘ You meet there with certain ‘ vagabonds, who carry ſerpents in a baſket, with ſome bran for ‘ their food, hanging on a ſtick, carried on the ſhoulders of two ‘ fellows; ſome of theſe ſerpents are ſix or nine feet long, of a graſs ‘ green colour, and not above an inch thick; ſome are very large ‘ and bulky, with grey ſpots; ſo ſoon as theſe Malabar vagabonds ‘ begin to play upon a certain inſtrument, like a bagpipe, the ‘ ſerpents ſet themſelves upright upon their tails, twiſt themſelves ‘ in a moſt ſurpriſing manner, and ſoon after raiſe their fins or ‘ briſtles which are near the head, and fall on with ſuch fury, as ‘ if they would tear one another in pieces, to the no ſmall terror ‘ of the ſpectators.’ I deſire to know, if any one, after reading this account, can think it reaſonable to diſbelieve the moſt extraordinary accounts of the power of muſic over the human mind, related by the antients, who were eye-witneſſes of what they relate. Thoſe who are verſed in natural hiſtory would be able, in all probability, to increaſe the liſt of animals that delight in muſic: For my part I have none to add but the graſhopper, (different no doubt from what we call ſo) of which there is a pretty fable in Plato, vid. Phæd. towards the beginning: and the claſs of birds, many of which are ſo remarkable for ſinging, that Lucretius imagined they firſt taught mankind the art of muſic; Et liquidas avium voces imitarier ante, &c. lib. 5. v. 1378.

§ 195.

Inanimate world harmonic.

But this is not the full extent of harmony according to the Pythagoreans and Platonicians. They ſuppoſed the univerſe itſelf and all its parts to be formed by the principles of harmony. Nor do I imagine they meant only to make uſe of a figurative expreſſion. There are traces of the harmonic principle ſcattered up and down, ſufficient to make us look on it as one of the great and reigning principles of the inanimate world; and though we have no proof, or indeed any reaſon to believe that the Greeks were acquainted with the foundation of ſome of their philoſophical opinions; yet what that very ſagacious and judicious philoſopher Mr. Maclaurin obſerves, Phil. Diſcov. of Newton, &c. p. 35. concerning the aſtronomy of Pythagoras, ſeems highly probable. ‘ When we find,’ ſays he, ‘ their accounts (i. e. of the Greeks) ‘ to be very imperfect, it ſeems reaſonable to ſuppoſe that they ‘ had ſome hints—only from ſome more knowing nations, who ‘ had made greater advances in philoſophy, &c.’ Thoſe more knowing nations I ſuppoſe to have been the Ægyptians, from whom the firſt and great outlines of every art and ſcience originally came. Maclaurin gives us one inſtance of the Pythagorean doctrine which could hardly be ſuppoſed to be of Greek original, the harmony of the ſpheres, and which, in conformity with Dr. Gregory, he explains as follows: ‘ If we ſhould ſuppoſe muſical chords ‘ extended from the ſun to each planet; that all theſe chords ‘ might become uniſon, it would be requiſite to increaſe or dimi- ‘ niſh their tenſions in the ſame proportions as would be ſufficient ‘ to render the gravities of the planets equal; and from the ſimi-

‘ litude of thoſe proportions, the celebrated doctrine of the harmony of the ſpheres is ſuppoſed to have been derived.’ Certain as this harmonic coincidence is now become, till Sir Iſaac Newton demonſtrated the laws of gravitation in relation to the planets, it muſt have paſſed for the dream of an Utopian philoſopher.

§ 196. *Colours harmonic.* Beſides the above-mentioned inſtance, which proves the harmony of the univerſe to be true in a literal ſenſe; and which we ſuppoſe to have been known to the antients; there is another inſtance totally new, diſcovered alſo by Newton, equally ſtriking, and equally extenſive. He found that the breadths of the ſeven original colours, were in the ſame proportion as the ſeven muſical intervals that compoſe an octave. The reaſon why this law was followed rather than any other, does not appear; nor has Newton given any the leaſt conjecture about it: but we cannot avoid believing that it tends ſome way or other to the perfection of the univerſe, either as to uſe or beauty; and that the proportions cannot be altered, without altering the phænomena for the worſe, unleſs we can believe that the proportions of the elements alſo might be altered without any bad effect.

§ 197. *All ſubſtances elaſtic, &c. are harmonic.* The inſtances I have hitherto given of the harmonic principle prevailing in the inanimate ſubſtances of the univerſe, have been much more taken notice of, both as making part of the ſublimeſt philoſophy that ever was invented, and alſo as being found in the greateſt and moſt intereſting objects in nature; but the ſame principle appears, if not with equal luſtre, yet not with leſs certainty on many other occaſions, and in a manner more intimately connected with muſic, both as to theory and practice; for all ſubſtances elaſtic, homogeneous, and continuous, whether animal, vegetable or mineral, yield, upon percuſſion, harmonic ſounds, i. e. they ring according to the common phraſe. This is notoriouſly the caſe of iron, braſs, earthen-ware, glaſs, wood, parchment, &c. and this happens, whatever their form may be. Nor is this owing to the motion produced in the air; for the ſame thing will happen, without any communication between the organs of hearing and the air. Faſten a ſtring to a poker, or any iron bar, hold the ſtring between your teeth in ſuch a manner that the poker may ſwing freely, ſtop your ears cloſe, make it ſtrike againſt the fender, and you will hear a loud clear ringing, as of a bell; nay, even the fire-pan, oddly ſhaped as it may ſeem for ſuch a purpoſe, will produce much the ſame effect: but the tongs, which are not a continuous body, make only a confuſed and indiſtinct noiſe. This experiment is ſo very common, and well known, that I remember to have diverted myſelf frequently with it when a child. Lord Keeper North mentions an experiment, which proves likewiſe, that we may feel muſic without the medium of air. In his Philoſ. Eſſay on Muſic, p. 16. he ſays thus: 'Such a continuity to the nerve of hearing will cauſe a ſenſe of 'ſound to a man that hath ſtopped his ears, if he will hold a 'ſtick that touches the ſounding inſtrument between his teeth.'

§ 198. *Muſic ought to be ſtudied.*

Since then it appears that it has pleaſed the Supreme Being to form many of his wondrous works according to the principles of harmony, and ſince it is certain that ſome of our pureſt and moſt affecting pleaſures ariſe from harmony, can it be looked upon as unbecoming to give up ſome of our time to the ſtudy of an act manifeſtly intended by Providence to allure us to the love of order, &c. according to the doctrine of Plato? Surely not: and the leſs ſo, as muſic has, not without reaſon, been thought to contribute to the cure of ſome diſeaſes. Baglivi, p. 363, ſays; Aliis morbis confert muſica, &c. Again, ib. Exercitatio vocis debito cantu ad plures conducit morbos, ut fuſe monet Hippocrates, 3. diæ. n. 16. et multo melius de inſomniis, n. 3. And the ſame Baglivi, p. 390, has a chapter intitled, De methodo curandi morbos complures muſicâ, ſaltatione, &c. I ſay nothing about the tarantula, becauſe the facts have been diſputed; how juſtly I know not. It is certain, that Baglivi and his father, both of Calabria, (the ſcene of the ſuppoſed phænomenon) and both eminent phyſicians, did believe them, as appears by the diſſertation on that ſubject written by the former. But however that may be, I have no doubt about ſome nervous caſes ſaid to have been relieved, and even cured, by muſic.

§ 199. *Muſic cauſes ſleep.* Plato obſerves, p. 881, that when mothers want to make their children ſleep, the remedy they uſe is not ſilence and reſt, but, on the contrary, dancing and toſſing them about in their arms, and enchanting them, as it were, by ſongs: and people, he adds, who are poſſeſſed with a bacchanalian fury, are brought to their ſenſes by the ſame method. The effect of ſounds is very extraordinary, and very various. The Pythagoreans, of all men, ſeem to have underſtood this matter the beſt; and to have made uſe of it, on many occaſions, to very good purpoſes. The ſtories and remains of that noble ſect, are full of accounts that appear to us fabulous, but may nevertheleſs be true. Lord Bacon obſerves, Nat. Hiſt. Art. 112, that the wind, purling of water, humming of bees, a ſweet voice of one that reads, &c. are opiates. Now that theſe ſounds, though not perhaps in themſelves, ſtrictly ſpeaking, harmonic, may yet put the nerves into harmonic undulations, appears by the phænomenon of Æolus' harp. The only difference is, that the air ſtrikes upon the ſtrings of the harp already tuned; whereas, it ſtrikes upon the nerves perhaps out of tune. But this difference is of no conſequence; for the ſoul has a power of adjuſting the auditory organs to any pitch requiſite, as is evident whenever a muſician changes the key abruptly; for in that caſe, it is ſome time before the ear can comprehend the harmony. Analogous phænomena,

nomena, in relation to the organs of ſinging and ſeeing, prove the truth of my aſſertion. It is therefore highly probable, that in ſome caſes, what produces harmonic undulations in the nerves, will produce ſleep; and that was the opinion of Pindar, who, in his ſublime Pythic ode, (finely imitated by one of our poets) ſpeaking of the eagle, ſays:

> Perch'd on the ſceptre of the Olympian king,
> The thrilling darts of harmony he feels;
> And indolently hangs his rapid wing,
> While gentle ſleep his cloſing eyelids ſeals;
> And o'er his heaving limbs, in looſe array,
> To ev'ry balmy gale the ruffling feathers play.
>
> *Weſt's* PINDAR.

This effect of harmony, the reaſon of which is not difficult to aſſign, were it conſtant, would be of the greateſt conſequence; for to produce ſleep, in ſome diſorders, is to produce a cure.

§ 200. *Horrible ſounds.*

I cannot omit, on this occaſion, to mention the oppoſite effect of diſcordant ſounds, as contraries illuſtrate one another beſt. Charlevoix, ſpeaking of the Indians of Canada, lett. 13. ſays, 'That their war-ſongs are at all times melancholy and doleful; 'but here they were to the laſt degree frightful; occaſioned perhaps, he adds, entirely by the darkneſs of the night, and the approaches of the feſtival.' I believe Charlevoix is miſtaken in his conjecture about the cauſe of the effect mentioned; for Anſon's Voyage, p. 30. ſays, 'That Orellana placed his hands hollow to 'his mouth, and bellowed out the war-cry uſed by thoſe ſavages, 'which is ſaid to be the harſheſt and moſt terrifying ſound known 'in nature. This hideous yell, &c.' And Plutarch, ſpeaking of the Parthians, when they attacked Craſſus, ſays, 'They do not 'uſe horns or trumpets in war; but by means of hollow clubs, 'covered with leather, and having bells faſtened to them, the 'Parthians ſpread a din far and wide. Theſe inſtruments ſend

'forth

'forth a deep and terrible ſound, ſomething between the howling 'of wild beaſts and the harſhneſs of thunder. This cuſtom the 'Parthians uſe, as knowing, that of all the ſenſes the hearing is 'the moſt capable of diſordering the mind, and that its operations 'have the quickeſt effect. The Romans, upon hearing theſe 'horrible ſounds, threw down their arms.' Plut. Vol. I. p. 557. But to return from the gloomy ſcenes of horror and diſcord to thoſe of cheerfulneſs and harmony.

§ 201. *Muſic accompanies content, &c.* It appears from a variety of concluſive circumſtances, that muſic is the voice of induſtry—of content—of ſerenity—of innocence.—In ſhort, it is the voice of nature, uncorrupted and unoppreſſed; and as ſuch is heard, and once was more frequently heard, in our fields and villages. When it is conſidered in this light, it is of all harmonies the moſt delightful; as ſuch, it has ſtruck men of the moſt delicate ſenſations.—The plowman whiſtling o'er the furrowed land—the milkmaid ſinging blithe—the ſpinſters, and the knitters in the ſun—and the free maids, that weave their thread with bone, chaunting, were objects that drew the attention of two of the greateſt poets the world has known. But agreeable as theſe effuſions of the heart may be to the ear of every man who has feeling; yet ſince it has pleaſed our good and great Creator, to grant us faculties capable of improving the imperfect ſallies of nature, I cannot conceive why we ought not to go a ſtep farther, and learn muſic as an art, and even make it a regular part of education, as was antiently the cuſtom of many wiſe nations. I would not willingly incur the cenſure of ſome grave and ſober people, who think we have already but too much of ſuch trifling and uſeleſs amuſements: I muſt therefore explain myſelf.

§ 202. *Young ladies ſhould learn muſic.* My opinion is, that young ladies at leaſt, who have a tolerable ear, to ſay nothing of the other ſex, ſhould learn muſic. But as I do not recommend it to them for the purpoſe of parade and oſtentation, ſo I ſhould not wiſh to have them attempt to rival theatrical performers, either in ſinging or playing. A proper model to imitate on this occaſion, may be ſeen § 181. where the paſſage quoted from Plato recommends only the ſimpleſt kind of muſic for the education of youth. In his books of laws, p. 893, he propoſes, that they ſhould begin at thirteen years of age, and continue for three years, and no longer. Something of this ſort might perhaps ſuit our young ladies in general. It ſeems ſufficient that they learn muſic enough to form their ear, and to be able to pick out an eaſy tune, by the help of ſome manageable and portable inſtrument, as the guitar; and particularly that they learn to tune it well. Their buſineſs ſhould be to practiſe merely for the amuſements of themſelves, their own family, and particular friends, or rather for domeſtic comfort, which they were by Providence deſigned to promote; viz. To calm the boiſterous paſſions—to relieve the anxieties and cares of life—to inſpire cheerfulneſs—to appeaſe the nerves, when irritated by pain, ſickneſs, or labour of mind or body, to ſooth the peeviſhneſs of infancy and old age—and to raiſe the mind to a feeling and love of order. She who ſhall improve the natural talents, with which women are born, of doing all theſe things, will not have miſpent her time by applying three years to muſic. How it ſerves thoſe noble purpoſes, as now practiſed, I leave others to tell.

§ 203.
Muſical diſcord.

That the divine gift of muſic was in a great meaſure intended for the purpoſes above-mentioned, ſeems clear from the courſe of nature in other animals. The birds, who, except man, are almoſt the only ſongſters in the creation, hardly ever ſing but to relieve the tediousneſs of incubation in the female; inſomuch, that whereever you hear a bird ſing, you may be generally ſure that there is a neſt not far off. It is natural to inquire, on this occaſion, why the ſongs of various birds ſinging together are not diſagreeable, as being neceſſarily diſcordant. To this I anſwer, that I do not believe they are diſcordant: Why ſhould we not ſuppoſe, that the delicate ear of the birds produces the ſame effect as we daily find amongſt men, who, however many in number, conſtantly fall into conſonant tones in converſing with one another? I never knew but one inſtance to the contrary; and that inſtance proved the truth of my aſſertion: for there was ſomething ſo unharmonious and harſh in his ſpeech merely on that account, that every body was offended with his want of ear, and wondered at it. The ſame ſolution ſerves for Shakeſpeare's muſical diſcord, as he calls it, ſpeaking of the cry of a pack of hounds. Midſummer Night's Dream.

§ 204. *Religious Muſic.* I find it difficult to quit this enchanted ground, ſurrounded as I am by ſirens on every ſide, who are tempting me to quit my courſe; but reaſon ſeems to beckon me away, and point to the port in view. However, I hear the voice of one who muſt be obeyed. Urania whiſpers me about muſic employed in the pure worſhip of God, 1 Chron. xxiii. 5. and 2 Chron. v. 12, 13.—of prophets propheſying, with a pſaltery, and a tabret, and a pipe, and a harp before them, 1 Chron. xxv. 3.—of injunctions to ſing praiſes to God, Pſal. xxxiii. 2. cl. 3, &c. Epheſ. v. 19. Coloſſ. iii. 16.—of ſaints harping and ſinging before the throne of God—of muſic accompanying the creation, Job xxxviii. 7.—the redemption, Luke ii. 13.—the reſurrection, 1 Cor. xv. 52. After what I have cited from ſcripture, it may ſeem quite unneceſſary to add a word farther on this ſubject; but ſuch is the weight and authority of one whoſe opinion I am going to produce, and ſo ably is his opinion drawn up, that I think every reader will approve of my enriching this treatiſe with it; eſpecially, as it not only relates to the laſt article, but to many other eſſential parts of the whole ſyſtem of muſic. The writer I mean is Hooker; who, in his Eccleſ. Polit. lib. v. artic. 38. ſays as follows:

§. 205.
Hooker on *muſic.*

'Touching muſical harmony, whether by inſtrument or by voice, it being but of high and low in ſounds, a due proportionable diſpoſition, ſuch notwithſtandiug is the force thereof, and ſo pleaſing effects it hath in that very part of man which is moſt divine, that ſome have been thereby induced to think that the ſoul itſelf by nature is, or hath in it harmonie; a thing which delighteth all ages, and beſeemeth all ſtates; a thing as ſeaſonable in grief as in joy; as decent being added unto actions of greateſt weight and ſolemnitie, as being uſed when men moſt ſequeſter themſelves from action. The reaſon hereof is an admirable facilitie which muſic hath to expreſſe and repreſente to the minde, more inwardly than any other ſenſible meane, the very ſtanding, riſing and falling, the very ſteps and inflections every way, the turnes and varieties of all paſſions whereunto the minde is ſubject; yea ſo to imitate them, that whether it reſemble unto us the ſame ſtate wherein our mindes alreadie are, or a cleane contrarie, we are not more contentedly by the one confirmed, then changed and led away by the other.'

§ 206.

'In harmonie, the very image and character of vertue and vice is perceived, the minde delighted with their reſemblances, and brought, by having them often iterated, into a love of the things themſelves. For which cauſe, there is nothing more contagious and peſtilent than ſome kindes of harmonie; than ſome, nothing more ſtrong and potent unto good. And that there is ſuch a difference of one kinde from another, we need no proof but our own experience; in as much as we are at the hearing of ſome more inclined unto ſorrow and heavineſs; of ſome more mollified and ſoftened in minde; one apter to ſtay and ſettle us; another, to move and ſtir our affections: there is that draweth to a marvellous, grave, and ſober mediocritie; there is alſo that carryeth, as it were, into ecſtaſies, filling the

APPENDIX.

‘minde with a heavenly joy, and for the time in a manner ſevering it from the body. So that, although we lay altogether aſide the conſideration of dittie or matter, the very harmonie of ſounds being framed in due ſort, and carryed from the ear to the ſpiritual faculties of our ſoules, is, by a native puiſſance and efficacie, greatly availeable to bring to a perfect temper, whatſoever is there troubled; apt as well to quicken the ſpirits, as to allay that which is too eager; ſoveraignne againſt mellancholy and deſpair; forcible to draw forth teares of devotion, if the minde be ſuch as can yeeld them; able both to move and to moderate all affections. The prophet David having therefore ſingular knowledge, not in poetrie alone, but in muſique alſo, judged them both to be things moſt neceſſarie for the houſe of God, left behinde him, to that purpoſe, a number of divinelie indited poemes; and was farther the author of adding unto poetrie melodie in publique prayer, melodie both vocal and inſtrumental, for the raiſing up of mens harts, and the ſweetning of their affections towards God.’

FINIS.

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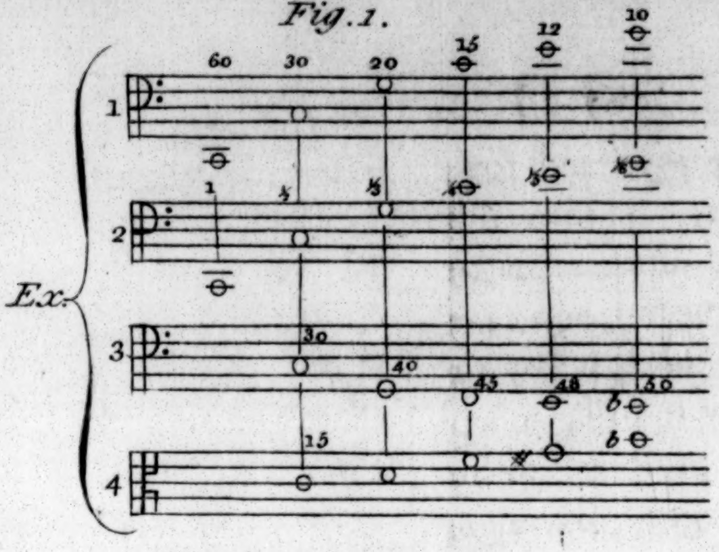

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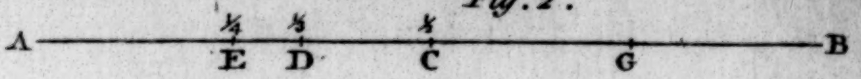

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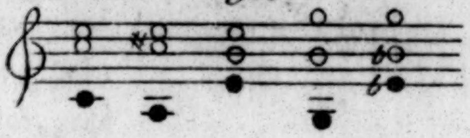

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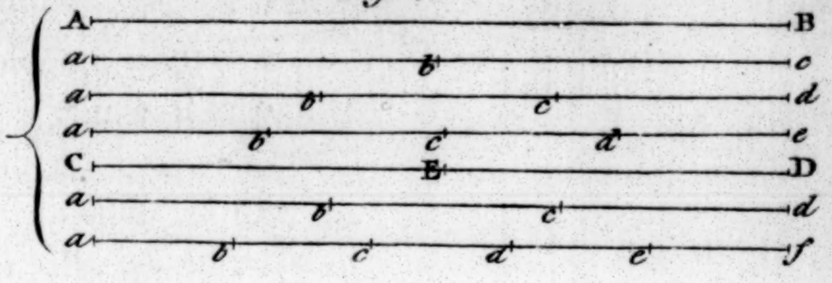

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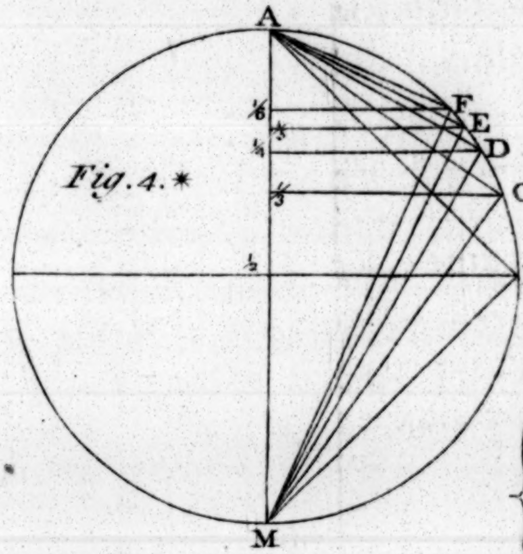

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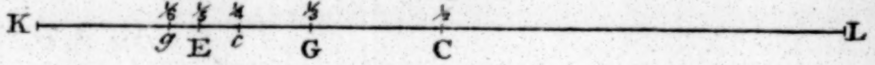

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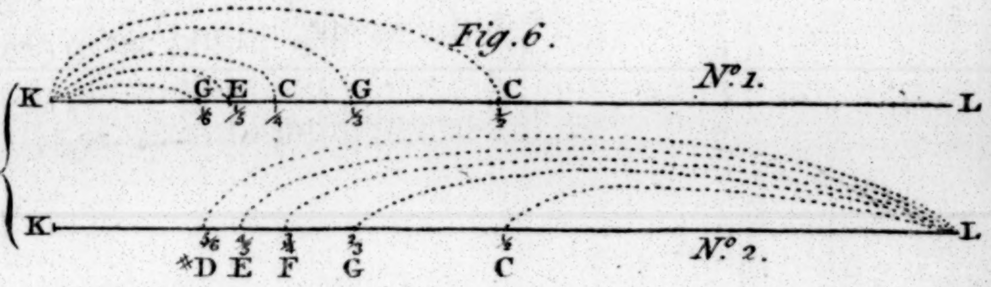

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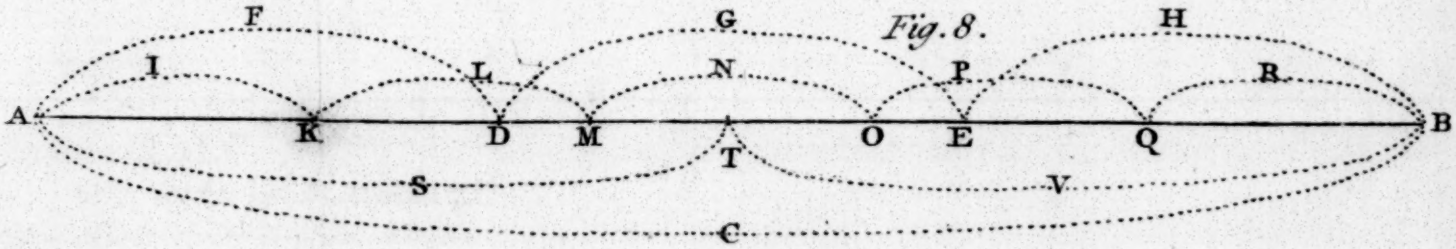

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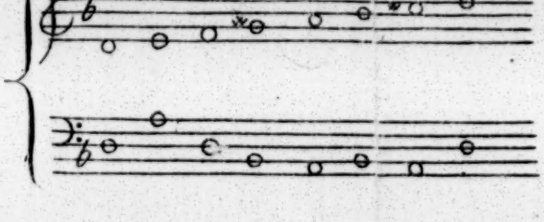

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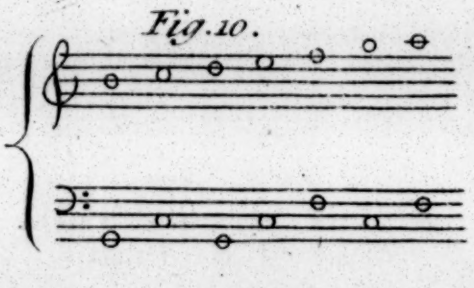

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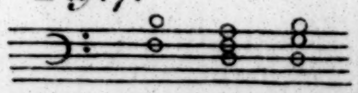

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